Appendix 1: West Butte Wind Power Project Final Avian and Bat Protection Plan and Golden Eagle Conservation Plan

WEST BUTTE WIND POWER PROJECT

FINAL AVIAN AND BAT PROTECTION PLAN
&
GOLDEN EAGLE CONSERVATION PLAN

MARCH 15, 2011

WEST BUTTE WIND POWER PROJECT

AVIAN & BAT PROTECTION PLAN
&
GOLDEN EAGLE CONSERVATION PLAN

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WEST BUTTE WIND POWER PROJECT

AVIAN AND BAT PROTECTION PLAN
&
GOLDEN EAGLE CONSERVATION PLAN

1.0 Introduction/Company Policy.

West Butte Wind Power LLC (WBWP), an Oregon limited liability company, is developing a 104 MW wind energy project on private property in Crook and Deschutes Counties, Oregon. The project is located 30 miles east of Bend and 30 miles south of Prineville on the 10,000 acre West Butte Ranch. Access to the turbine locations on the private property has to cross in part BLM lands.

WBWP believes that conservation of the environment is an important aspect of development of the West Butte Project. As an environmentally conscious company WBWP is committed to promoting development of clean renewable energy with its associated positive environmental benefits, while limiting the adverse impacts of the project on Avian and Bat Species, including Golden Eagles. These impacts include direct strike mortality, injury from birds running into turbines, and overhead power lines, and electrocution from overhead power lines. This Avian and Bat Protection Plan & Golden Eagle Conservation Plan (Plan) proposes post operational fatality monitoring of migratory birds and bats, and mitigation measures intended to result in no net loss of golden eagles, if fatalities occur. It also includes an Adaptive Mitigation Section that discusses mitigations that will be used if certain levels of impacts occur to migratory birds and bats and specifically to Golden Eagles.

2.0 Existing Legal Frame Works

The Endangered Species Act (16 U.S.C. § 1531 et seq.; ESA) prohibits the harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capture, or collection of a listed species. ESA provides specific mechanisms to authorize “incidental” take that occurs as a result of an otherwise legal activity and does not jeopardize listed species or adversely modify habitat designated as critical. The Golden Eagle is not a listed species. In fact there are no listed species on the site.

The Migratory Bird Treaty Act (16 U.S.C. § 703 et seq.; MBTA) prohibits the taking, killing, possession, transportation and importation of migratory birds, their eggs, parts, and nests, except when authorized by the Department of

Interior. While MBTA has no provision for allowing an "incidental" take, it must be recognized that some birds may be killed at renewable energy developments even if all reasonable measures to avoid it are implemented.

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; BGEPA) further protects eagles from "take", where take is defined as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, disturb individuals, their nests and eggs. "Disturb" was defined in 2007 (72 FR 31132) as "to agitate or bother a bald or golden eagle to a degree that causes…injury to an eagle, reduced productivity, or nest abandonment…"

Under provisions of USF&W Service policy and Federal Regulations the provisions of this Plan are voluntary to WBWP and offered by WBWP to minimize impacts to avian and bat species, including Golden Eagles.

3.0 Site Suitability and Pre-constructions Site Surveys:

3.1 Northwest Wildlife Consultants (NWC) Study Area and Habitat

The Project area lies almost entirely in southwestern Crook County, Oregon, with the main access road lying mainly in Deschutes County. The Project lies north of Highway 20, thirty-two miles east of Bend, and is located on the land formation known as the Bear Creek Buttes, with the vast majority of the Project located on West Butte (See maps in Appendix C).

The habitat is primarily shrub-steppe, with sagebrush throughout, but there is a large—and increasing—western juniper component. Historically, the juniper was likely confined to the draws, with periodic wildfires preventing it from establishing on the uplands. Much of the juniper currently found on the Project area is relatively young, a fact that suggests recent encroachment facilitated by fire suppression.

Ponderosa pine is sporadic on the Project area except in two places, where rather large stands can be found. Spring-fed streams are small, and so no riparian systems exist to break up the shrub-steppe habitat. Nonetheless, topographic relief exists primarily in the form of rolling hills, and some of the draws between these hills will carry water from late winter and spring snowmelt.

3.2 Review of Existing Information and Database Search

NWC conducted an initial database search. Which was done to ascertain the Endangered, Threatened, and special status species of wildlife and plants likely to be present in and near the Project area. The U.S. Fish and Wildlife Service maintains lists (by County) of endangered, threatened, proposed, and candidate species and species of concern, and these electronic file lists

were accessed for both Crook and Deschutes Counties (See Appendices A-1 and A-2 of the NWC Biological Report which is Appendix C of this Plan.). In addition, in January 2008 a list of documented occurrences of rare, threatened, and endangered plant and wildlife species within 5 miles of the Project leased land boundary (which was provided to NWC as of January 2008) was requested from the Oregon Natural Heritage Information Center (ORNHIC; Appendix A-3 of the NWC Biological Report). Results were reviewed and special status vascular plant species and special status vertebrate wildlife species with potential for occurrence on the Project site are listed in Appendices B and C of the NWC Report (Appendix C of this Plan).

NWC conducted extensive surveys on the proposed site including habitat, avian and bats. Their attached report (Appendix C) identifies and describes wildlife, including avian and bat studies other field investigations associated with the West Butte Wind Power Project, and the results of studies they completed.

Surveys were designed to assess the presence on and use of the Project area by special status wildlife and plant species as well as to document the site's use by the more common wildlife species during specific seasons. Scientific names for the common animal and plant species found in the NWC report can be found in Section 4.2 and Appendices of the NWC Report.

3.3 Raptors:

Results of wildlife and habitat studies conducted by NWC over three years describe the site to be a low raptor use site. Extensive studies were done on passerines and raptors. Based on these studies NWC's golden eagle specialist found that no special restrictions on the use of the site, or turbine locations, because of raptors including eagles were warranted. Raptor use on the site is one of the lowest in the northwest for wind energy projects for a variety of reasons: the lack of steep cliffs which would provide nesting and soaring opportunities; topographic rounded hills providing minimal desirable nesting places (no golden eagle nests exist on the property).

One Golden Eagle nest in a large Ponderosa pine that did exist within a quarter of a mile from the property was burned by a BLM controlled burn in the fall of 2009. The tree is still standing but is dead and the nest is severely damaged. NWC's Golden Eagle expert does not believe that the nest is habitable, and since all of the Ponderosa Pines in this grove were burned, the chance of a GE return to nest in this area is extremely unlikely.

Most of the turbine locations are covered by volcanic basalt rock (West Butte is an extinct volcano) so there is little opportunity for ground based prey such as ground squirrels to establish a position to become prey for raptors; and there is a general lack of water on the site which makes it less attractive to raptor and Golden Eagle prey. Because of the above reasons the WBWP Project area <u>does not</u> provide high quality raptor habitat.

The existing main risks to raptors, including Golden Eagles in the site area would come from collisions or electrocution from the four main 500 kV transmission lines that run within five miles of the project site. Additional risks come from persons shooting the eagles and from lead poison from eagles scavenging of animals shot with lead bullets. Finally a number of raptors, including eagles could be killed by highway traffic in the area, especially along Millican Highway and Highway 20 where large truck use frequently occur.

Methods and results of study components relating to raptors, including Golden Eagles are reported within this summary. These are:

- Review of existing information, database search and informal consultation with Agencies
- Avian use surveys (large-plot)
- Small-plot avian surveys (breeding passerines)
- Bat species inventory
- Special status wildlife surveys
- Aerial raptor nest surveys

3.4 Raptor Nest Surveys

The objective of the completed raptor nest surveys was to obtain information that will help predict potential impacts of the Project to nesting raptors. Potential impacts include those that might occur during construction or operation of the Project and might involve disturbance during nesting, direct loss of nest structure, or death of nesting birds or fledglings through collision with turbines. Information gained from this study is expected to be useful for avoiding, minimizing and/or mitigating impacts and for designing post construction monitoring studies.

The first aerial survey was conducted on May 21 and 22, 2008. An additional helicopter survey was done on May 22, 2009. The two years of aerial surveys were performed from a helicopter, using a qualified avian ecologist and a helicopter pilot experienced at conducting these types of surveys. These surveys covered the entire Project area and a two-mile buffer around the turbine strings and access road. All potential nesting areas—trees, transmission lines, and rock formations—were searched for raptor nests, with both active and inactive nests recorded.

Locations of all raptor nests were recorded with a hand-held Global Positioning System (GPS) unit. To determine whether a nest was active or inactive, the biologist relied on clues that included behavior of adults and presence of eggs, young, or whitewash. Attempts were made to identify the

species of raptor associated with each active nest. Ground-based confirmation of nests, status, and outcome were accomplished during the course of other studies.

In 2010, the two Golden Eagle nests identified within two miles of the project boundary in 2008 and 2009 were monitored from the ground by a golden eagle specialist.

In total there have been three years of surveys that included golden eagle searches, one year of extensive on-site surveys for all species of birds, and two years of helicopter raptor nests surveys. Two additional helicopter raptor nest surveys will be completed in the Spring of the year that construction starts. During the Golden Eagle survey, the survey area will be increased to encompass all potential golden eagle nest locations (cliffs rimrocks, pine trees and transmission poles) within six miles of the Project area.

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3.5 Avian Use Surveys (large-plot)

Five 800-meter-radius, non-overlapping avian use study plots were delineated on the Project area (Figure 3 of the NWC Biological Report, Appendix C). Plot placement was designed to maximize viewing and provide excellent coverage of the proposed turbine strings as well as varying habitat and topography. Weekly avian use surveys were conducted for a one-year period. Results for designated winter, spring, summer, and fall seasons are included within the NWC Report attached as Appendix C.

Winter season surveys began November 21, 2007 and ended March 14, 2008. Spring season surveys began March 22 and ended May 28, 2008. Summer season surveys began June 5 and ended August 14, 2008. Fall season surveys began August 19 and ended October 31, 2008. Avian use surveys follow a variable circular-plot method to determine species composition and relative abundance of birds using the Project and flight altitudes associated with avian use of this area. Survey protocol is similar to that used in the Columbia Basin of Oregon and Washington including the Leaning Juniper Phase I and Phase II Wind Projects (Kronner et al. 2005), Klondike I Wind Power Project , and Klondike III Wind Power Project.

An experienced avian ecologist is positioned at the center of the plot and collects data on all wildlife seen or heard during a 20-minute observation period. This includes observations both within and outside the 800-meter radius (though several analyses may use only the within-plot data). A full set of surveys (5 plots) is generally completed on the same survey day, weather permitting, and plots are surveyed equally during different times of day (morning, mid-day, and afternoon), to the extent feasible, to reduce temporal bias. High snow level and inclement weather prevented access to some plots on several occasions in winter and spring, and a thunderstorm prevented one survey from being completed in summer.

In winter season, surveys were conducted for 15 weeks and there were 15 visits to 3 plots and 11 visits to 2 plots for a total of 67 surveys. In spring season, surveys were conducted for 11 weeks and there were 11 visits to 3 plots and 10 visits to 2 plots for a total of 53 surveys. In summer season there were 11 visits to 4 plots and 10 visits to 1 plot for a total of 54 surveys. In fall season there were 11 visits to each of the 5 plots for a total of 55 surveys. For each plot, the surveyor remained at the plot for a full hour (that is, an additional 40 minutes) during 4 of the 11 fall surveys. The purpose of this extension was to strengthen confidence that surveys did not miss any movement through the area by fall migrants, especially among raptors. Avian use tables (section 4.4 of the NWC report) show only the data from the first 20 minutes for these surveys, but the text identifies raptors detected during the additional 40-minute portions of these fall surveys.

General data recorded includes date, time, weather, and wildlife observed. Data collected on birds detected includes species, number of individuals, habitat association, and behavior, including flight height and direction. In addition, flight paths of raptors and other species of interest were hand-plotted in the field at the time of observation. These are then plotted on individual plot maps (topographic maps with study plot boundary delineation). Whenever special status species and species of interest (including raptors, sage-grouse, and big game) were observed while in-transit near the study plots, within the general Project area, these observations were also recorded. Data were entered into a Microsoft Access database.

3.6 Small-plot Avian Surveys

Small-plot avian surveys complement the large-plot avian use surveys. In particular, the small-plot surveys focused on smaller birds (passerines) utilizing the habitats of proposed developments during the breeding season. These data were used in describing overall habitat quality and value for native wildlife.

These surveys involved the establishment of eight fixed-radius points in spring 2008, each of which was surveyed three times during the spring breeding season: May 10, 31 and June 12, 2008 (all 8 plots surveyed 3 times for a total of 24 surveys). Points covered each habitat type on the Project, and were also spaced across the length and width of the area. Study plots were 100-meter in radius. Plots were surveyed by an experienced avian ecologist using a ten-minute observation period, and all surveys were completed between sunrise and five hours after sunrise, consistent with standard protocols used nationwide. Surveys were not conducted when wind and weather conditions were likely to hamper the researcher's ability to detect whatever birds were present.

General data recorded included date, time, and weather variables. Data associated with bird detections included species and number, age and sex,

behavior and habitat. Locations of all detections were plotted on a map of the point. Species encountered in-transit between survey points were also recorded. Products resulting from this study include a list of avian species using the Project area during the breeding season and associated analyses (including, but not limited to, diversity indices and a list of confirmed breeders).

3.7 Special Status Wildlife Surveys

Surveys for special status wildlife species were conducted between May 15 and June 9, 2008. The area covered was 451 acres associated with the access road and 1,785 acres associated with proposed turbine strings. This area was surveyed by walking meandering ground transects averaging 50 meters apart from one another throughout the Project area. The area covered included a 200-foot buffer around proposed turbine strings and the roads connecting them and a 200-foot buffer on either side of the proposed access road. All of sections 31 and 32 were covered (since exact placement of turbine strings had not yet been confirmed). All special status species encountered were recorded in field notebooks and with a handheld GPS unit or plotted on USGS topographical map. GIS-generated maps were prepared showing locations of individuals or clusters of breeding pairs.

3.8 Greater Sage-Grouse Lek Censuses

After discussions with ODFW and BLM it was collaboratively decided that the known lek site on the project be monitored. Ground-based censuses were conducted on three dates in spring 2008, April 4, April 18, and May 2, 2008 of the one known greater sage-grouse lek within the Project as identified by the Oregon Natural Heritage and Information Center. Surveys were aimed at determining the number of individuals associated with this lek. Lekking occurs before and just after sunrise, and thus censuses were conducted for approximately an hour during this period. The observer approached as quietly and unobtrusively as possible, balancing a desire to obtain a good view with the need to avoid disturbing the birds. Binoculars and, where necessary, a spotting scope were used to determine the number and sex (when possible) of individuals present at the lek. The lek was again monitored in 2009 and 2010 with basically the same number of males observed**.**

3.9 Inventory of Bat Species

During each of the three nights of bat inventory, temperatures were relatively warm (10-15 degrees C) during the sample period, and insect presence (particularly moth activity) was evident. Wind speeds varied from less than 5 to greater than 10 kph.

Approximately 87 echolocation calls were recorded during this study. Of these, 45 were useful for a relatively positive identification. This method does

not allow one to distinguish number of individuals of a given species; ten calls of one species may be made by ten different individuals (on the one extreme) or may represent ten calls by the same individual (on the other). What can be determined from the data is species composition at the different sites. Five different bat species were positively identified, and five others were tentatively identified during surveys. Only the clearest of calls were used, and doubtful calls were not used for analysis.

Survey #1: July 30, 2008

On the first night of inventory, three species were positively identified: little brown bat (*Myotis lucifugus*), small-footed myotis *(M. ciliolabrum*), and long-eared myotis (*M. evotis*). Calls of individual bats of from one to five other species—whose call frequencies and patterns overlap considerably—were also detected. One or more—or all—of these species might have been present: hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), and/or big brown bat (*Eptesicus fuscus*), which share a call frequency, and California myotis (*M. californicus*) and/or *Yuma myotis* (*M. yumanensis*) which share another call frequency.

Survey #2: August 29, 2008

Five species of bat were positively identified on the second night of bat inventory. These were little brown bat, small-footed myotis, long-eared myotis, pallid bat (*Anttrozous Pallidus*), and Townsend's big-eared bat (*Corynorhinus townsendii*). Other calls indicated the presence of one, two, or all of the following species as well: hoary bat, silver-haired bat, and big brown bat.

Survey #3: September 11, 2008

Four bat species were positively identified on the third night of surveys. They were little brown bat, small-footed myotis, long-eared myotis, and Townsend's big-eared bat. Also detected were the calls of California myotis and/or Yuma myotis.

The Table below summarizes bat species by survey station. As discussed above, some species were not positively distinguished from others with similar calls; these included big brown bat, hoary bat, and silver-haired bat which all have the same call frequency as well as California myotis, and Yuma myotis which share a call frequency. Full descriptions of survey stations can be found in the Table below and in Table 1 in section 3.9 of the NWC Report.

Bat species detected by survey station at West Butte Wind Power Project, July-September, 2008.

Species (CODE) Scientific Name Common Name	Station A *Lower elevation corrals*	Station B *Ponderosa pine*	Station C *Ridge-top cattle water tank*	Station D *Cattle water tank- meadow*
(MYEV) *Myotis evotis* Long-Eared Myotis	X	X	X	X
(MYCA) or (MYYU) *Myotis californicus/yumanensis* California Myotis/Yuma myotis	X	-	-	X
(MYLU) *Myotis lucifugus* Little Brown Bat	X	-	X	X
(MYCI) *Myotis ciliolabrum* Small-Footed Myotis	X	-	-	X
(ANPA) *Anttrozous Pallidus* Pallid Bat	-	-	-	X
(LANO) *Lasionycteris noctivagans* Silver-Haired Bat Or	X	-	-	X
(LACI) *Lasiurus cinereus* Hoary Bat Or	X	-	-	X
(EPFU) *Eptesicus fuscus* Big Brown Bat	X	-	-	X
(COTO) *Corynorhinus townsendii* Townsend's Big-Eared Bat	-	X	-	X

3.10 Habitat Mapping

Habitat mapping within the proposed Project area was initiated in the spring of 2008 and was completed in October 2008 (Figures 2a and 2b NWC Report Appendix C). Mapping was conducted utilizing a combination of aerial photograph interpretation and on-the-ground verification. The mapping effort characterizes the range of habitat types present within the Project area from the perspective of potential and existing wildlife use for both general (i.e. shrub-steppe obligates) and specific (i.e. special status species) vertebrate taxa.

Prior to field surveys, initial habitat boundaries were delineated in a digital GIS environment at a scale of 1:5,000 using 2005 1-meter resolution color orthophotographs. These broad habitats were further defined into subtypes based on field surveys conducted in the spring/summer of 2008. For each habitat type, field notes included dominant and co-dominant vegetation and

overall habitat quality (vegetation structure, age, size of trees, presence or absence of invasive vegetation, history of disturbance). Experienced wildlife biologists sampled each of the habitat types during various field studies and draft habitat maps were adjusted and refined as necessary to reflect actual conditions in the field. Once final adjustments were made, amounts of acreage were calculated by habitat type for the Project area and for the areas along the access road.

4.0 Results

4.1 Review of Existing Information and Database Search

Target lists of special status species of plants and wildlife with potential for occurrence were developed using USFWS county lists (Appendices A-1 and A-2 NWC Report) as well as the ORNHIC database search (Appendix A-3 NWC Report). These target lists also include other details about sightings or likelihood of occurrence and can be found in the NWC Report Appendices B and C-Appendix C of this Plan. A copy of the response letter received in March 2008 from ORNHIC (site data excluded) to the request for a database search for records is included in the NWC Report, Appendix A-3. Unfortunately ORNHIC has not included golden eagles among the species tracked in these data bases.

4.2 Habitat Mapping

Seven land cover/habitat types were mapped within the Project area (Figure 2a NWC Report, Appendix C) and along the access road (Figure 2b NWC Report-Appendix C). Habitat types and acreages are presented below. One habitat type, ponderosa pine, occurs in two distinct, well-defined stands, which together comprise only a small portion of the Project area. The remainder of both the Project area and the land on either side of the access road is a mosaic of three main habitat types. Big sagebrush steppe and dwarf shrub-steppe are the habitat types that have likely persisted on this landscape for centuries, with soil type and depth determining their locations. Juniper woodlands now covering large parts of the area were a much less prominent habitat type until recent years. Though they were a component of the landscape previously, junipers were generally confined to draws and to the lower elevations along the access road; the presence there of older trees testifies to this. Most of the junipers on the landscape today, however, are much younger, and provide evidence of recent encroachment due to fire suppression.

These three habitat types are not separated by clear lines of demarcation; rather they gradually give way to one another. An area was designated juniper woodland wherever junipers constitute more than 10% of the vegetative density. Nonetheless, junipers dot the entire landscape and will continue to increase in density (except where removal measures are

undertaken or natural fire occurs). Indeed, juniper removal has been an ongoing management method in recent years, and acreages that would have been labeled juniper woodlands at the beginning of the habitat mapping process are now deemed to be big sagebrush steppe (since the junipers have been cut in the interim).

The Project area is remarkable for its habitat health (the overall ecological condition) when compared to other nearby areas of similar habitat types. Despite years of cattle grazing, the habitat remains in good ecological condition (with the exception of juniper encroachment). The plant species present are those appropriate to healthy, undisturbed areas, though it is difficult to assess whether the proportions of those species have changed as a result of grazing. There is a dearth of exotic plant species, and even those native species generally associated with disturbance are confined to relatively small areas immediately adjacent to roads.

Two spring-fed streams are found within the Project area. Though providing water for wildlife, these have little or no effect on habitat type. Each is very small (less than a meter in width) and does not provide for any different plant associations. That is, no riparian trees or shrubs are found along these streams (at least at the elevation of the Project); rather, they represent small lines of water running through the big sagebrush steppe or juniper woodlands that cover the landscape.

The Project area consists of a series of rounded buttes and the draws separating them. The topography is rather gentle; there is very little in the way of escarpments, cliffs, or talus, and none of a size that warranted mapping. Neither the Project area nor West Butte itself contain any of the sort of cliffs or rimrocks that offer the preferred nesting substrate for golden eagles. Present within two mile of the Project area are some isolated large ponderosa pines, which can be used for nesting by this species.

The absence of cliffs and canyons also means that the Project area contains no concentrations of the yellow-bellied marmots (an important prey species for golden eagles in the region) or of the variety of medium-to-large birds and mammals necessary for successful breeding attempts. Moreover, winter conditions on the Project area are considerably harsher than on the surrounding lower elevations, and wintering by eagles on the Project area is not expected.

4.3 Avian Use Surveys (large-plot)

This section summarizes results of winter, spring, summer, and fall season avian use surveys. Only 11 species of birds were detected during winter surveys, with Townsend's solitaire being by far the most abundant wintering bird. Spring brought an influx of avian species, and 37 species were detected during avian use surveys during the spring months. Twenty-five avian species were detected during summer season surveys and 31 species were

detected during fall (Table 2, NWC Report-Appendix C). A complete species list for avian surveys can be found in Appendix E of the NWC Report.

Raptor detections were rare during all survey seasons. American kestrel was recorded on four occasions during the spring, four times in summer, and three times during the fall. A single golden eagle was detected during spring surveys. Red-tailed hawks were recorded once during winter surveys, five times during spring surveys, four times during summer, and three times during fall. Rough-legged hawk was detected once during winter surveys and twice during spring surveys. Two turkey vultures were observed, one during fall and one during summer surveys. In addition, there were three detections of golden eagle, four turkey vultures, one Cooper's hawk, and one red-tailed hawk outside of the 800m study plot that were not included in the analysis or tables below. Extended (hour-long) surveys conducted in the fall season did not lead to an increase in raptor detections.

Raptors, shrikes and other species of interest detected while the surveyor was in-transit to and between points are reported in Table 3 of the NWC Report-Appendix C. Several avian species were detected in-transit that were not detected during point counts in any season including ferruginous hawk, loggerhead shrike, northern shrike, northern goshawk, and sharp-shinned hawk. Family groups (adults with young) were detected on several occasions including red-tailed hawk, Cooper's hawk, and mountain quail.

4.4 Raptor Nest Survey

Aerial raptor nest surveys were conducted on May 21 and 22, 2008, and on May 22, 2009. Each covered an area of 48,500 acres (75.78 mi^2).

Fourteen nests of five species of raptors were documented within two miles of the Project and access road (Table 7 NWC Report-Appendix C; Figure 4). Many nests found during the aerial survey were inactive when encountered, including both assumed (by composition and/or location) golden eagle nests and all six of the nests deemed to have been built by ferruginous hawks. Inactive nests may be used by various species of raptors in future years. Five nests were active when found, including three red-tailed hawk, one American kestrel, and one Cooper's hawk nest. These include two nests (Cooper's hawk and American kestrel) found during special status wildlife species ground transect surveys.

The two inactive nests assumed built by eagles were both in large ponderosa pines. A single eagle was seen in the vicinity of one of the nests in 2008. It may be that a nesting attempt occurred in 2008 at that nest but had failed by the time of the survey flight. Neither of these nests was active in 2009. Monitoring of these nests in 2010 detected a breeding attempt at the western base of West Butte (approximately 2 miles from the project) boundary. This breeding attempt failed toward the end of the incubation period or shortly after hatching. In the fall of 2009, BLM conducted a controlled burn that got

out of control and burned the closest Ponderosa Pine and golden eagle nest. This was not discovered until October of 2010.

A pair of ferruginous hawks was observed near the cluster of six inactive nests assumed built by this species in junipers. While it is possible that surveyors missed an active nest, it seems as though this pair of hawks experienced an early failure of this year's nest attempt. The pair of ferruginous hawks was frequently encountered in this area early in the breeding season, but eventually disappeared before successful fledging of young would have been expected to occur.

Three active red-tailed hawk nests were documented. Two were in ponderosa pines somewhat north of the proposed turbine strings, and one was in a juniper tree within two miles of the access road. The latter nest attempt has since failed, whereas fledging occurred at one of the pine nests. (The other pine nest is relatively inaccessible, and so monitoring of its outcome did not take place.) Two inactive nests were also found that were determined to be built by red-tailed hawk (one in a juniper tree and one in ponderosa pine).

The Cooper's hawk nest in a juniper tree near Daly Spring had three 2-week-old chicks on July 14, 2008. Young American kestrels successfully fledged from their nest in a juniper cavity (near where the access road meets the proposed turbine strings). American kestrel pairs were more frequently encountered at lower elevations along the access road; there are likely other cavity nests of this species in the large junipers at that elevation.

Neither the Project area nor the area within two miles of it contain large rim rock or cliffs suitable for nesting by golden eagles or prairie falcons. Smaller rock outcrops may, however, provide holes that could be used for nesting by American kestrels and barn owls.

Nests located during the 2008 aerial raptor nest survey, and ground-based surveys of the West Butte Wind Power Project.

Species	# Nests found during aerial survey	# Nests found during ground transect surveys
American kestrel	0	1
Cooper's hawk	0	1
red-tailed hawk	3	0
inactive *Buteo* nest (assumed built by ferruginous hawk)	6	0
inactive *Buteo* nest (assumed built by red-tailed hawk)	2	0
inactive assumed golden eagle nest	2	0

5.0 Discussion

5.1 Raptor Use.

Avian use metrics such as mean use and frequency of occurrence provide insight on the relative abundance of birds of concern and their risk of colliding with proposed wind turbines. For raptors, such metrics and subsequent (post-construction) fatality estimates are available for a number of regional wind-generation facilities. One early, poorly-sited wind project in Altamont, California killed red-tailed hawks, northern harriers, golden eagles, American kestrels, prairie falcons, and turkey vultures, with raptor fatality estimates as high as 1/MW/yr (Erickson et al. 2001). At eight newer projects in the northwest regional area however, the mean raptor fatality estimate was 0.07/MW/yr.

Table 10. NWC Report - Annual fatality estimates on a per turbine and per MW nameplate basis for all birds and for all raptors in the Columbia Basin Ecoregion where fatality monitoring studies have been completed.

Columbia Basin Ecoregion Wind Project [1]	All Bird Fatality Rates		Raptor Fatality Rates [2]	
Listed in order of highest to lowest All Bird Fatality Rate per MW/Year	#/ MW	#/ Turbine	#/ MW	#/ Turbine
Klondike II, OR	3.1	4.7	0.11	0.17
Stateline I and II, WA/OR	2.9	1.9	0.09	0.06
Nine Canyon I[3], WA	2.8	3.6	0.05	0.07
Combine Hills, OR	2.6	2.3	0.00	0.00
Big Horn, WA	2.5	3.8	0.15	0.23
Wild Horse[4], WA	1.6	2.8	0.09	0.17
Hopkins Ridge, WA	1.2	2.2	0.14	0.25
Vansycle, OR	1.0	0.6	0.00	0.00
Klondike I, OR	0.9	1.4	0.00	0.00
Mean	**2.07**	**2.59**	**0.07**	**0.11**

[1] Projects are sorted by cumulative bird per MW rates. References for projects: Stateline I and II-partial (Erickson et al., 2004); Vansycle (Erickson et al., 2000); Klondike I (Johnson et al., 2003c); Klondike II (NWC and West, 2007); Combine Hills (Young et al., 2006); Nine Canyon (Erickson et al., 2003a); Hopkins Ridge (Young et al., 2007); Big Horn (Kronner et al., 2008); Wild Horse (Erickson et al., 2008). Only projects with similar study methods included.

[2] Raptor estimates include diurnal raptors and owls.

[3] Nine Canyon II monitored only part-year.

[4] Wild Horse estimates include only data for the first year of a 2-year study.

Mean use at the West Butte Wind Power Project for all raptor species combined ranged from 0.03/20-min survey in the winter to 0.23/20-min survey in spring. The mean use in fall (0.145/survey) was considerably lower than either spring or summer; this low mean use figure is indicative of the fact that the Project area does not function as a raptor migration route, as it

lacks the sort of topography that leads to concentrations of southbound birds of prey. Extending the survey period (to one hour during each of 20 surveys) during fall resulted in the detection of only a single additional raptor (an American kestrel).

This range (0.03–0.23/20-min.) of mean raptor use at West Butte Wind Power Project is considerably lower than raptor use at many other wind projects in the region, including Rattlesnake Road Wind Power Facility, Oregon (0.43-0.81/30-min; Kronner et al. 2007a), Klondike Wind Project , Oregon (0.49–0.73; Johnson et al. 2002), White Creek Wind I (0.38–0.56/20 min.; Kronner et al. 2005), Leaning Juniper, Oregon (0.24–1.07/20 min; Kronner et al. 2005), Big Horn Wind Project, Washington (0.40–1.5/20 min; Johnson and Erickson 2004; Kronner et al. 2006a and 2006b). Predicted annual fatality of raptors per MW once the Project is operational would likewise be expected to be lower compared to that observed at other wind energy sites. All cite references can be found in the NWC Report-Appendix C of this Plan.

5.2 Raptor Nests

There were 4 active raptor nests found in 2008 within two miles of the Project area and access road, excluding American kestrels (for the purposes of comparison with other projects, and because nests of this species are difficult to confirm using aerial surveys). Raptor nest density in the surveyed area (75.8 mi^2) was thus 0.05/mi^2. Nest density is likely to vary from year to year, but the number of inactive nests found can help predict maximum density. In the case of West Butte, a high nesting year would likely include one active golden eagle nest within two miles of the site (since two inactive nests were found north and west of the Project boundary-**Note: the closest one of the two GE nests and its tree grove were accidently burned in 2009 by BLM**) and one active ferruginous hawk nest (since a cluster of inactive nests was found east of the access road) in addition to three active red-tailed hawk nests.

The 2008 raptor nest density at the West Butte Project (0.05 mi^2) was lower than at many other wind projects in the Pacific Northwest. Examples include Leaning Juniper Phase I Wind Project in Gilliam County, Oregon (0.41/mi^2; Kronner et al. 2005), Rattlesnake Road, Oregon (0.45/mi^2 Kronner et al. 2007), Big Horn Wind Project in Klickitat County, Washington (0.11/mi^2; Johnson and Erickson 2004), and Stateline Wind Project on the Oregon/Washington border (0.21/mi^2; Erickson et al. 2004).

Given the relatively low density of raptor nests combined with the low mean raptor use of the Project area, estimates of raptor fatality at West Butte Wind Power Project are expected to be extremely low. Any such fatalities are likely to consist primarily of red-tailed hawks and/or American kestrels; these species had the highest mean use of the area, and are the species that comprise a large percentage of raptor fatalities at wind projects in the U.S.

6.0 Post Construction Avian and Bat Monitoring Plan

In Appendix B attached is the Wildlife Monitoring Plan that the West Butte Project will use to monitor impacts to wildlife on site post construction. Some supplemental monitoring for Golden Eagles post construction is found in the following Sections. This Plan may conflict with the NWC Wildlife Monitoring Plan, as to frequencies and amounts of surveys. Where that occurs the provisions of this Plan shall prevail.

7.0 Additional Avian and Bat Survey Plans

7.1 Raptor Surveys - General

In the Spring of the year of construction two additional helicopter studies of raptors will be conducted. One will be a general raptor study of the site and two miles around it to follow up on the previous helicopter studies. The other will be a Golden Eagle Survey (see Section 9.2)

7.2 Additional Bat Surveys

WBWP has agreed to conduct additional bat surveys in the fall of the year following issuance of the BLM ROD and Notice to Proceed. The survey will consist of additional bat call identification efforts conducted systematically throughout the site area by the installation of bat monitoring equipment. Additionally, the mortality monitoring during years following start of operations will also provide information as to use of the project area by bats.

If these additional surveys and mortality monitoring indicates that there is an above average bat use of the site than West Butte will conduct cut in speed studies to see if bat fatalities can be reduced by such operational changes. WBWP will work with USF&W to design a statistically valid operational cut in speed curtailment and monitoring program. The program will based on the results of the fatality monitoring and will specify a specific time frame for the experiment, i.e. the highest usage of the site by bats.

7.3 General Mitigation Measures/Project Design Features

The following Mitigation Measures/Design Features will be implemented by the Project to Minimize Impacts to all avian species, including raptors and golden eagles.

1. Prior to construction, flagging of sensitive habitat areas (e.g. raptor nests, wetlands, etc.) near proposed areas of construction activity will be completed and such areas designated as “off limits” to all construction personnel. The required ¼ mile construction buffer for all active Golden Eagle and Ferruginous Hawk nests will be observed during construction. The GE nest setback will also include a ½ mile line of site set back.

2. Prior to construction, training will be provided to construction staff explaining restrictions that protect wildlife, habitat, and critical area features in or near the construction zones.

3. Designated construction zones will be enforced. Construction personnel will avoid driving over or otherwise disturbing areas outside the designated construction areas.

4. Prior to construction, an environmental monitor will be designated to train construction personnel on avoidance of sensitive areas and to monitor construction activities to ensure compliance with mitigation measures and Permit Conditions.

5. Prior to construction, a fire control plan shall be developed and implemented, in coordination with local fire districts, to minimize risk of accidental fire during construction and operations, and respond effectively to any fire that does occur. This is also a condition of approval to obtain a building permit with Crook County.

6. A 20 mile per hour speed limit shall be established and enforced during construction to minimize potential for striking wildlife.

7. The Project Developer shall provide continuing access for BLM, the County and wildlife agencies to monitor wildlife, habitat enhancement and revegetation efforts, subject to project safety requirements and permission from the landowners.

8. Environmental sensitivity training will be given to all operations personnel on site whether employees of the operating company or its contractors that will include training regarding protection of existing native habitats.

9. Underground (vs. overhead) electrical lines near turbine strings shall be used to minimize electrocution hazards to golden eagles from downed power lines. The 115 kV transmission line, substation transformers, and conductors will be constructed using APLC (1994, 2006) to prevent raptor electrocution.

10. No hunting in the project area will be allowed by construction or maintenance personnel.

11. Reporting of big game fatalities and/or injured big game discovered on-site for the life of the Project will be done in a timely manner (monthly) to ODFW and USFWS.

12. Project Developer will choose the type of turbine lights that are accepted by the wind power industry and accepted by the FAA for safety, as being least impacting to night migrating birds. The goal will be to minimize use of turbine lights while still following FAA requirements. All FAA lights will illuminate synchronously.

13. All overhead power line conductors will be spaced to minimize potential for raptor electrocution.

14. Anti-perching devices shall be installed to assist in keeping raptors off of power poles.

15. Low RPM turbines will be used with tubular towers to minimize risk of bird collision with turbine blades and towers. No ladders or landings will be allowed outside the turbine tower.

16. In the spring, and prior to construction, a helicopter survey of raptor nests will be conducted.

17. Sensitive raptor nest trees will be noted and monitored. The environmental monitor will work with the construction contractor to prevent construction work around active nests of sensitive raptors as identified in BLM's Upper Deschutes Resources Management Plan. The required ¼ mile construction buffer for all active Golden Eagle and Ferruginous Hawk nests will be observed during construction.

18. The project developer shall report bird fatalities and injured birds discovered on-site for the life of the Project in a timely manner in conformance with the Fatality Monitoring Program section of the West Butte Wildlife Monitoring Plan document, as prepared by NWC.

19. If any injured birds are discovered, personnel will contact designated bird rehabilitators for advice and assistance in delivering the bird to the rehabilitator per the rehabilitator's instructions. A list of specified rehabilitators in Central Oregon best for different species will be provided to the environmental monitor during construction and for the operations personnel. The list will be kept in the Operations Center onsite.

20. Raptor nests within the project area will be monitored for use and productivity to determine potential indirect impacts to raptors. The objectives behind raptor nest surveys are to estimate the size of the local breeding populations of raptor species in the vicinity of the Project and to determine whether a reduction or increase of nesting activity or nesting success in the local populations of raptor species exists. Raptor nests will be monitored during the first and fourth years after construction. 2008 baseline data will be used as "pre-construction" use data.

21. The goal of the monitoring plan will be to monitor for avian fatalities in a portion of the Project for a two year time period. Forty percent of turbine sites will be sampled the first year after start of Operations, and another 20% the following four years will be monitored.

22. Identify and remove all carcasses of livestock, big game, etc. from within the Project site or off site but near turbines that may attract foraging.

23. Minimize the potential for creating habitats suitable for rodents, such as rock piles and eroded turbine pads with openings underneath that will additionally attract raptors, especially golden eagles.

24. All permanent meteorological towers will be unguyed. Existing met towers will be removed prior to operations.

25. All facility lighting will be focused downward and triggered by motion detectors.

26. A weed control/prevention plan shall be prepared and be approved by Crook County/BLM.

27. The site shall be kept clean of all garbage that could attract rodents and or golden eagles

8.0 Adaptive Management Measures, including Compensatory Measures for Migratory Avian and Bat Species, not including Golden Eagles.

8.1 Baseline Mortality.

Project will establish a baseline mortality level as follows: 0.11 raptor fatalities per installed turbine per year; and 2.48 other bird fatalities per installed turbines per year. To determine mortality numbers over time WBWP will agree to conduct mortality studies for the first four years of operations. Year one shall review 40% of the turbines on site, and years two through four 20% of the turbines will be monitored each year.

8.2. Adaptive Management Levels:

- Level One is defined as avian mortality that exceeds the baseline established in 8.1 above.
- Level Two is same as Level One except that mortality levels occur for two years, during the four year mortality studies.
- Level Three is same as Level One except that mortality levels occur for three years, during the four year mortality study.

8.3 Ten Fatalities Per Turbine.

A separate baseline will be established which requires that any turbine or cluster of turbines that cause ten or more mortalities per year will be specifically monitored to determine the causes of the mortalities. If this

occurs a Mitigation Plan for that specific turbine will be created in cooperation with USF&W Service.

8.4 Cut in Speed Study.

A statistically valid six month cut in speed study will be conducted to see if changing cut in speeds from 3 meters per second to 5 meters per second will significantly reduce avian fatalities. This study will be done in the first year of fatality monitoring, and may be combined with other mitigation studies. WBWP will consult with the Service in designing the Study.

8.5 Level One Minimization Measures.

- Blade Painting: If Level One is exceeded then WBWP will paint 25% of the turbine blades in a pattern to be determined by the Operator in consultation with USF&W. WBWP has the option of painting the blades prior to installation of the turbines. WBWP shall conduct mortality studies on a controlled number of painted and non-painted turbines. If panted turbines are installed originally, than the mortality study shall be part of the overall project mortality study for the first year of post operations. WBWP will consult with USF&W to determine the location of the painted turbines, but the intent is to install them on the end or turbine rows and other locations that might have a higher potential for avian impacts.

- Monitoring: WBWP will conduct an additional year of monitoring at any problem turbines based on the mortality studies that triggered a Level One violation. WBWP will consult with the Service on design of the additional monitoring studies.

- Electric Pole Retrofit: WBWP will retrofit 11 local utility poles to bring them up to APLIC standards for avian electrocution prevention, every year that the project exceeds baseline. WBWP will consult with USF&W Service to determine a priority for pole retrofits.

8.6 Level Two Minimization Measures.

- Blade Painting: If the Level One Blade Painting Study results show that this is an effective avoidance deterrent than an additional 25% of project turbine blades will be painted, during the annual turbine maintenance shut down.

- Monitoring: WBWP will conduct an additional year of monitoring at any problem turbines based on the mortality studies that triggered a Level One violation.

- Conservation Measures for Passerines: WBWP will in consultation with USF&W develop and implement conservation measures for

passerines, either on or off site. WBWP will reduce Juniper coverage by 50% on one Section of land each year that the project is in Level Two. A protocol for the conservation measures will be developed in conjunction with the USF&W Service. If Juniper removal is used as mitigation for other impacts, such as to Sage Grouse then the acreage will apply to both mitigations.

8.7 Level Three Minimization Measures.

- Blade Painting: If proven effective under the Level One Study WBWP would paint the balance of the Project turbine blades, during the annual turbine maintenance shut down.

- Monitoring: WBWP will conduct an additional year of monitoring at any problem turbines based on the mortality studies that triggered a Level One violation.

- Turbine Operating Curtailment: If the monitoring can determine the likely cause for the fatalities, such as time of day, avian usage, topographic circumstances of the turbine location, or other data which would substantiate that a specific curtailment of a turbine's operation would result in reducing future avian mortality, the project operator would curtail the offending turbine or turbines on the following basis. Curtailment Restrictions: none at night (except for a few species most birds do not fly at night); none during winter months of December 1 to April 1 (because of snow coverage on the site avian usage of the site is minimal in winter, see NWC avian usage report attached as an Appendix C to this Plan); Time of day would be restricted to 10:00 am to 4:00 pm (the time of most active raptor use); Turbine cut in speeds would be increased from 3 meters per second to 5 meters per second on the offending turbine(s) for a period of 1,464 hours total.

9.0 Additional Golden Eagle Surveys and Adaptive Management Measures, including Compensatory Measures for Golden Eagles

9.1 Purpose

This Section describes additional Golden Eagle Surveys to be conducted and Mitigation & Adaptive Management Measures that will be used by the Project and USF&W Service to respond to avian mortality and to assure that there will be no net loss of Golden Eagles populations from the project's operations. Eagles will be monitored as outlined above in Section 7.2. Additional fatality monitoring of eagles will take place for the life of the project by trained maintenance personnel.

Because of their status Golden Eagle injuries or fatalities must be prevented and if an injury of fatality does occur than the project operator must commit to mitigation measures that will result in no net loss to the Golden Eagle population.

Mean use by golden eagles of the project area during NWC surveys was 0.019 (mean number of individuals within 800-m plot/20-minute point count) in spring and 0.00 in summer, winter, and fall. This is extremely low, reflecting the paucity of the principal golden eagle prey species and their habitat. Black-tailed jackrabbits were occasionally detected during surveys of the Project area, but their numbers are greater at the lower elevations surrounding the Project. Yellow-bellied marmots were only rarely encountered near the Project, which lacks both the rock outcrops and the agriculture in proximity to which this species tends to flourish. Three colonies of Belding's ground-squirrels were documented near cattle troughs, but these were apparently of insufficient size to attract consistent foraging by golden eagles.

It is impossible to suggest that not a single golden eagle will collide with a turbine rotor over the life of a wind turbine project such as this one. Nonetheless, based on the extremely low use by golden eagles of the West Butte Wind Power Project area, the project is deemed to have very low risk of impacts to golden eagles. This applies to local breeders, migratory birds, and wintering eagles. Moreover, the nearest breeding territories are expected to exhibit relatively low productivity (historically and in the future), such that should a fatality occur, the impacts to the Great Basin's golden eagle population would be slight.

9.2 Additional Golden Eagle Surveys

A Golden Eagle Survey will be conducted earlier in the year of construction and will be specific to Golden Eagles. WBWP and Northwest Wildlife will meet with USF&W to determine a helicopter survey area to observe Golden Eagle Nests in the area of the project. The survey area will not be a fixed 6 mile radius but rather will encompass areas based on their probability of locating golden eagle nests. Survey should include the 5 known historical eagle nest sites. Repeat surveys will be conducted every five years after the initial GIS or Ground Observation Studies are completed.

After this aerial nest survey is done WBWP will have NWC, its wildlife consultant, conduct ground surveys of nests within 6 miles of the West Butte site, nests located on public lands or those that would be able to be monitored from public lands. The surveys will be conducted during the breeding and nesting season to see how many of the nests were used in the year of construction. Surveys will be done using approved USF&W protocols. Annual ground surveys of the located nests will be done during nesting season every year for five years after the wind farm is operational to determine nesting activity. An additional Golden Eagle Survey will be done if

there is a Golden Eagle Fatality on site. All GE studies will be done consistent with Pagel, et.al. 2010. This data will be submitted to USF&W for its use.

If possible, NWC will install a GPS unit on at least one adult of each GE pair occupying a unique home range that occurs within the 6 mile boundary. They will also attempt to capture and mark at least one juvenile eagle produced from within the 6 mile area. If NWC is unsuccessful in capturing the target eagle(s) then the attempts to capture will continue for three following consecutive years. If capture is still unsuccessful, then ground monitoring for eagles will be conducted in the GE territories within 6 miles of the project site. These surveys will be conducted monthly during Spring and Summer months for three years. WBWP and USF&W will need to agree on ground monitoring and GPS protocols, such as Pagel et al. As an example, 4-6 accessible high elevation points could be used to oversee much of the territories.

The purpose of these Aerial Surveys, Telemetry and Observation posts are to determine GE use areas, risk factors, and measures that can be implemented to reduce and avoid impacts through micrositing, and operational adaptive management. Preconstruction GE surveys should be completed in the 2011 breeding season or prior to Project construction. These surveys would also inform seasonal and time of day curtailment, if any.

Operations personnel will monitor areas around turbines when conducting routine maintenance on turbines. WBWP and USF&W will develop a protocol for these surveys and conduct training for maintenance personnel. These surveys will continue for the life of the project. Extra monitoring will be done for any turbine involved in a GE mortality. A protocol and education program will be developed in conjunction with the USF&W Service.

9.3 Golden Eagle Adaptive Management Measures, including Compensatory Measures in the case of a Golden Eagle Fatality.

9.3.1 Power Lines

All project power lines will be built to current avian-safe standards that have been developed by the Avian power Line Interaction Committee. The power line will also meet National Electric Safety Code requirements. The Project will provide information to the USF&W Service of the specialized designs to protect avian species including Golden Eagles. The energized conductors on site will be separated a minimum of 72 inches from grounded hardware on both the 115 kV and the 14.4 kV power lines. The project will also adopt the pole design that most provides protection to golden eagles. Most likely this consists of a vertical separation of conductors and lines running down one side of the power pole. Fiber Optic lines shall conform to APLIC standards.

9.3.2 Power Pole Upgrades

The project will work with local utilities to upgrade 11 power poles per year within 10 miles of the project area to bring the pole up to the current APLIC standards.

9.3.3 Extensive Monitoring

Extensive monitoring of any turbine or cluster of turbines that causes a Golden Eagle fatality will be initiated immediately after such a fatality occurs. Study would include visual monitoring of eagle usage of the site where the fatality took place, during two visits per month for 6 months after the fatality, or at the same time of year of the mortality the following year. Golden Eagle observations will be reported to the USF&W. Specifics of the monitoring program will be developed in conjunction with the USF&W Service

9.3.4 Turbine Curtailment

If the monitoring can determine the likely cause for the fatality, such as time of day of Golden Eagle usage, topographic circumstances of the turbine location, or other data which would substantiate that curtailment of a specific turbine's or turbines' operations would result in reducing future Golden Eagle mortality, the project operator would curtail the offending turbine or turbines on the following basis.

- Curtailment Restrictions: none at night (eagles do not fly at night); none during winter months of December 1 to April 1 (because of snow coverage on the site eagles would not be hunting in the turbine area);

- Time of day would be restricted to 10:00 am to 4:00 pm (the time of most active Golden Eagle flight). Time of day may be adjusted based upon further information obtained during telemetry and/or ground GE monitoring ;

- Turbine operations of the offending turbine(s) would be curtailed by changing cut in speed from 3 meters per second to 5 meters per second for a period of 1,464 hours per year (April 1 through Dec 1 during the hours between 10 am and 4 pm). This curtailment will result a reduction in turbine operation from 90% of the time to approximately 60% of the time, and the turbine will only operate during periods of high wind speeds (greater than 5 meters/sec).

9.3.5 Additional Utility Pole Upgrades

In the case of a Golden Eagle Fatality an additional 11 utility poles per year for the life of the project would be retrofitted to APLIC standards to prevent raptor electrocution.

9.3.6 Conservation Study

A $20,000 grant from WBWP would be used for a high priority GE conservation needs research activity, to be implemented in the year following any GE mortality.

9.3.7 Additional Nest Studies

In case a Golden Eagle fatality takes place after the three year GIS or Ground Observation Study, WBWP will undertake a new nest study of Golden Eagle activity within 6 miles of the project area (duplicating the original 6 mile study).

9.3.8 Future Technology

Additionally, the operator commits to the implementation of future technology when available which might avoid GE interaction with turbines. If the Level 2 mitigations such as blade painting, etc. could be used in preventing additional GE fatalities in the event that one occurs, then the operator will be willing to implement such measures.

9.3.9 Construction Restrictions

The operator commits to limiting construction between January 1 and July 15 within one mile of an active nest (or ½ mile if not line of site).

9.3.10 Fledgling Monitoring

The operator commits to monitoring to the extent feasible all fledglings within six miles of the site. A report of their activity will be submitted to USF&W.

9.3.11 Lighting on Site

Lighting on site will be minimized. Lights on the substation and switch yard will be motion activated and only be used in case of an emergency. Turbine lights will be kept to the minimum required for the FAA and will be synchronized to all flash at the same time.

9.3.12 Use of Maintenance Personnel for GE Mortality Monitoring

Maintenance personnel will be trained to survey the surrounding area of each turbine that they approach for maintenance for GE carcasses for the life of the project. A report of this will be included in the maintenance report and a summary sent to USF&W annually. WBWP and the USF&W will develop a protocol for education of maintenance workers.

9.3.13. GE Mortality Reporting

Any GE mortality or injury will be reported within 24 hours to the Service's Wilsonville OLE and the Portland Regional Office and Bend Field Office and arrangements to transfer the carcass or injured bird will be made immediately.

9.3.14 Annual Reports

Annual Reports will be provided for monitoring and adaptive management activities, nest occupancy and productivity data, summarized and raw satellite telemetry data. These will be sent to the USF&W.

10.0 Action Items Involving the Service

WBWP will accomplish all of the below listed action items when they are required.

10.1 Performance Responsibility

WBWP hereby confirms that it is responsible to carry out all of the terms of this Avian & Bat Protection Plan & Golden Eagle Conservation Plan. If the Project is transferred to another entity then the Terms and Responsibilities of this Plan will be transferred to the new entity, who shall be responsible for carrying them out.

10.2 Bat Studies

WBWP will develop a Protocol with the Service for conducting additional bat studies. If the studies and mortality monitoring indicate a high number of bat deaths from the turbines, then WBWP will work with the Service to design a statistically valid operational cut in speed curtailment and monitoring program.

10.3 General Mitigation Measures

These Design Features found in Section 7.3 will all be implemented at their appropriate time

10.4 Ten Fatalities per Turbine

If ten avian fatalities per turbine or cluster of turbines occur, WBWP will work with the Service to develop a Monitoring & Mitigation Plan for the turbine(s) in question.

10.5 Level One Minimization

- WBWP will work with the Service to determine where blade painting should be accomplished and what design should be used.

- WBWP will consult with the Service to determine which electric pole retrofit will occur.

- The Service shall determine if it wants to employ acoustical avoidance measures on West Butte.

10.6 Level Two Minimization

- If blade painting proceeds than WBWP shall consult with the Service to determine which additional turbines blades should be painted.

- The Service shall determine if additional acoustical measures should be implemented

- WBWP and the Service shall develop conservation measures for passerines.

10.7 Additional Golden Eagle Surveys

- WBWP and the Service shall determine a helicopter survey area for the 6 mile survey. Surveys will be done using accepted Service protocols.

- WBWP will develop a protocol with the Service on the monitoring of nests located during the helicopter surveys.

- WBWP and the Service need to agree on GPS telemetry protocols and locations of capture attempts. A protocol will be developed with the Service regarding the monitoring of any captured and tagged GE's.

- If tagging is unsuccessful after three years of attempts, then WBWP and the Service will develop a Ground Monitoring Program.

- WBWP will develop with the Service a protocol for using WBWP operational personnel to monitor turbine areas for GE mortality.

10.8 Extensive Monitoring

In the case of a GE fatality, WBWP will work with the Service to develop a monitoring program for the turbine(s) involved.

10.9 Additional Utility Pole Upgrades

If additional utility pole upgrades are required, than WBWP will work with the Service to decide where to implement the upgrades.

11.0 Implementation

11.1 Permits Required

The BLM will incorporate this ABPP in its Record of Decision and Grant of Right of Way for the Project.

11.2 Employee Training

All appropriate facility personnel will be properly trained in avian and golden eagle issues, including basic avian biology, ecology behavior, presence, site use, monitoring protocols, and key issues that may result in significant impacts to the species. The training will encompass the reasons, need and methods by which employees should report an avian mortality, follow nest management protocol, dispose of carcasses. Comply with applicable regulations, including the consequences of non-compliance, and the appropriate agencies that should be contacted after incidents. NWC has a qualified golden eagle specialist that lives in Madras who will be on call to deal with any Golden Eagle incidents.

11.3 Quality Control

On a bi-annual basis, the Project Manager and the Environmental Coordinator will conduct a review of all activities dealing with the ABPP to ascertain if any changes are needed in practices or procedures to guarantee that the goals of this plan are achieved. Any Golden Eagle mortality associated with the project will also trigger a review of the plan.

11.4 Key Resources

This plan, injury and mortality reporting forms, contact information for avian rehab, USF&W, ODF&W and other useful information will be maintained by the Project Environmental Coordinator on site in the Operations Center.

11.5 Public Awareness

The project will undoubtedly be involved in giving site tours and educational information to schools and relevant community groups in the area. As part of this public outreach, the project will discuss the interaction of the project and the wildlife in the area, including Golden Eagles. The project will also support a Golden Eagle Education visit to schools in the area by an eagle rehabilitation center.

Appendix A

NWC Wildlife Risk Assessment

for the

West Butte Wind Power Project

Wildlife Risk Assessment

West Butte Wind Power Project

Prepared for

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1.0 INTRODUCTION

Northwest Wildlife Consultants, Inc. (NWC) based in Pendleton, Oregon was contracted by West Butte Wind Power, LLC (WBWP) to conduct a variety of wildlife surveys associated with the West Butte Wind Power Project (Project) located in central Oregon. Results of those surveys were compiled into a comprehensive report submitted in November 2008 (Gerhardt et al., 2008). Two of the surveys—the greater sage-grouse lek census and the aerial raptor nest survey—were conducted again in 2009 (Gerhardt et al., 2010), and in spring 2010 NWC personnel again monitored both the sage-grouse lek and the two historical golden eagle nests found within 2 miles of the proposed Project.

As is standard with development projects applying for county-level Conditional Use Permits, the wildlife, plant, and habitat reports submitted did not include an Impacts Assessment section (as required for applications that go through Energy Facility Siting Council permitting process). Since the submission of those permit application reports, however, there has been increased concern by the United States Fish and Wildlife Service (FWS) regarding the potential impacts of wind energy development upon golden eagles and their populations. As part of an Avian and Bat Protection Plan (ABPP), WBWP is required to include a section on risk assessment, which is expected to address not only golden eagles, but all migratory birds as well as bats. Habitat and rare plant impacts are addressed in other documents. Impact minimization and mitigation measures implemented and proposed for the three primary project phases (pre-construction project planning, construction and operations) were previously described in Gerhardt et al., 2008.

This document, which is based upon the results of the site-specific surveys (Gerhardt et al., 2008; Gerhardt et al., 2010), is meant to provide an assessment of the risks of the proposed Project, including turbines, transmission line, and roads, to the vertebrate wildlife species associated with West Butte. The information from this document is intended to be useful for WBWP in their writing of an Avian and Bat Protection Plan.

2.0 RISK ASSESSMENT FOR WEST BUTTE WIND POWER PROJECT

2.1 Impacts to Threatened and Endangered Wildlife Species

2.1.1 Mammals

There were no Federal or State Listed, Proposed, or Candidate mammal species documented. Therefore, the Project is expected to have no impacts.

2.1.2 Birds

No birds classified as Threatened or Endangered by the U.S. Fish and Wildlife Service or by the Oregon Department of Fish and Wildlife were detected during site-specific surveys, nor are any known from the Project area historically. Thus, construction and operation of the Project are not expected to have a negative effect on any listed avian species.

2.2 Impact Assessment for Avian Species

This section focuses primarily on impacts to birds from the operating turbines. The most probable direct impact to birds resulting from the proposed Project is direct mortality or injury due to collisions with the turbines. Collisions may occur with resident birds foraging and flying within the area, or with birds migrating through the area.

Based on a year-long study, mean bird use (the mean number of individuals/20-minute point count, which provides an index of relative abundance per survey point) for all birds combined was lower within the West Butte survey area than recorded at most other pre-construction wind project studies in the Northwest. Specifically, all bird use for four seasons combined was among the lowest when compared to ten other wind projects located in Oregon, as shown in Figure 1. Assuming that mean use is a reliable predictor of avian fatalities (as discussed by Downes et al., 2008), then avian fatalities at West Butte are expected to be at the low end of the regional range (Figure 1). Factor such as annual variation in precipitation and other habitat influencing factors are likely to influence bird use at the site over the life of the operating project and could result in higher or lower negative interactions with wind turbine.

Further discussions of potential impacts to bird groups including passerines, raptors, waterfowl, shorebirds, and special status avian species are described in detail below.

2.2.1 Raptors

Mean use (as analyzed from avian use survey data, Gerhardt et al., 2008) and raptor nest density (Gerhardt et al., 2008; 2010) were compared to those at regional wind projects (where similar pre-construction surveys were conducted and where post-construction fatality monitoring has been completed) to assess potential raptor risk and species at risk at West Butte.

Concern over the issue of raptor collisions at wind projects is due to the fact that numerous raptor species have been documented as fatalities at such projects. As examples, the mean raptor fatality estimate from fourteen new generation wind projects in the Midwest and West (Stateline, OR/WA; Vansycle, OR; Klondike, OR; Nine Canyon, WA; Foote Creek, WY; Buffalo Ridge, MN; Wisconsin; Buffalo Mountain, TN; Top of Iowa, IA) was 0.04 raptor fatalities/MW/yr.

Raptor nest density at West Butte (where the survey area extended 2 miles beyond the proposed turbines, transmission line, and roads) was 0.05/mi^2 in 2008 (Gerhardt et al., 2008) and 0.07/mi^2 in 2009 (Gerhardt et al., 2010). These figures include active nests of those species whose nests are normally detected through this survey method, but do not include cavity-nesting species (such as American kestrel). Included in both of these densities is a single active nest of Cooper's hawk; this species likely does not nest within the project boundaries of most of the Columbia Plateau Ecoregion (CPE) projects used for comparison, and is not easily found through this survey method. Both the 2009 and 2008 raptor nest densities at West Butte are lower than that of each of 13 other regional existing and proposed wind projects, for which the average density of raptor nests is 0.30/mi^2, and the range 0.11 to 0.80/mi^2 (Table 1, in which the higher, 2009, density is shown for West Butte).

Raptor mean use varied at West Butte from highs in spring and summer (0.226 and 0.222, respectively) to a low of 0.03 in winter (with an intermediate value of 0.145 in fall; Table 4 in Gerhardt et al., 2008). Red-tailed hawk and American kestrel comprised most of this use in all seasons. As with raptor nest density, raptor mean use at West Butte was lower than that at existing and permitted regional wind projects with comparable four-season mean use estimates (Figure 2).

Red-tailed hawk and American kestrel are the raptor species that exhibited the highest mean use at West Butte, and so would be the species most likely to collide with turbines. Both species have a history of turbine collision in the region, having been found as fatalities

at numerous wind projects including Leaning Juniper I, Rattlesnake Road, and Wheat Field Wind Farm (Gritski, 2010a and b; Kronner et al., 2005a). Other locally nesting diurnal raptor species that were observed during surveys—Cooper's hawk, and ferruginous hawk—are also at some risk of collision. Risk to special status raptors is discussed below.

Owl species that have been found as fatalities at regional wind projects include barn owl, short-eared owl, long-eared owl, and great-horned owl (Table 2). A single long-eared owl and a single great-horned owl were each observed during surveys at West Butte (Table 3 in Gerhardt et al., 2008), and suitable nesting habitat exists for both species; thus there is potential for collision of these species with turbine rotors.

No raptor migration was detected at West Butte. Although West Butte rises a considerable distance above the surrounding landscape, its topographic relief is gentle, especially on the west side, from which prevailing winds come. In addition, West Butte is rather isolated from the nearest high points, and is not a part of the sort of north-south ridge that tends to concentrate migrant raptors. Of migratory species, a single turkey vulture and a single sharp-shinned hawk were observed during fall avian use surveys (Table 2 in Gerhardt et al., 2008), and mean raptor use at West Butte was lower in fall than in spring or summer (Table 4 in Gerhardt et al., 2008). Thus, the Project is expected to have a low risk of impact to migrating raptors.

Based on data collected since 1999, average annual fatality estimates for raptors (including owls) at 16 regional wind projects range from 0 to 0.29 per MW/year (Table 2). Since both raptor nest density and raptor mean use were lower at West Butte than at these other projects, and since no raptor migration was detected at West Butte, it is expected that raptor mortality at the Project will be lower than—or at the lower end of the range of—these other projects.

2.2.2 Passerines

Passerines have been the most abundant avian fatality at wind projects in the Northwest, comprising >65% of the fatalities overall (Table 3). Passerines include many dozens of native species and some non-native species, which generally outnumber other groups (such as raptors), and their collision rate is likely in proportion to their overall relative abundance in the landscape. By far the most numerous species among fatalities in the region is horned lark, with an average of 31.2% of all observed fatalities (Table 3). Unlike at most of these other projects, however, horned lark is not an abundant species at West Butte. In winter at West Butte, four species—Townsend's solitaire, house finch, American robin, and common raven—made up more than 80% of all bird detections, with Townsend's solitaire comprising 52% of the total. Two species—Brewer's sparrow and mountain bluebird—accounted for more than 50% of all summer detections, whereas mountain bluebird, American robin, and Townsend's solitaire together comprised more than 57% of fall detections (Gerhardt et al., 2008). As far as is known, none of these species is particularly susceptible to collision with turbines, and all but Townsend's solitaire have routinely been found during preconstruction surveys in the region. Nonetheless, the number of documented fatalities of each is relatively low, with American robin being the highest at less than 1% of all documented fatalities (Table 3).

The passerine species most likely to be found as a fatality at West Butte is western meadowlark, based on its presence at the Project during spring and summer (Gerhardt et al., 2008) and its common detection as a fatality at other regional wind projects (Table 3). Other common breeding birds at West Butte, vesper's sparrow and Brewer's sparrow, are ground-nesting species that do not exhibit the high courtship and territorial flights that

bring horned larks into the rotor-swept area. Nonetheless, both of these species are found, albeit infrequently, as fatalities at regional wind projects (Table 3).

Small numbers of migrant species will likely also be found as fatalities at West Butte. Forest- and riparian-dwelling species were not recorded with regularity at West Butte, since they do not frequent the habitat types found on the Project. Nonetheless, based on trends from regional wind projects where such species are likewise undocumented during preconstruction surveys (Gritski et al., 2010, NWC and WEST, 2007; Erickson et al., 2004; Kronner et al., 2008a), they tend to migrate at night across a broad landscape that includes most or all habitat types, and some collide with turbines. Next to horned larks, the most frequent fatality at regional wind farms is golden-crowned kinglet (Table 3), a nocturnal migrant that is mostly unrecorded during diurnal preconstruction surveys.

As previously described, actual number of fatalities (passerines or other avian groups) may vary among years during the life of the Project as fluctuations in weather patterns and other environmental events may influence avian activity levels and distribution patterns.

2.2.3 Waterfowl and Wading Birds

Nationally, waterfowl fatalities at land-based wind facilities have been low compared to overall use (Kingsley and Whittam, 2007). Wind projects with year-round waterfowl use have shown the highest waterfowl fatalities, although levels of waterfowl/waterbird fatalities appear insignificant compared to use of the sites by these groups.

In the Northwest, several fatalities of geese and waterfowl have been reported, but waterfowl have not comprised large numbers of observed fatalities during fatality monitoring studies (Table 2). Two Canada goose fatalities were documented at the Klondike I (OR) wind project (Johnson et al., 2003a), although several Canada goose flocks were observed during pre-construction surveys (Johnson et al., 2002b). Fatality monitoring during the first year at Rattlesnake Road Wind Project found a single Canada goose fatality (Gritski, 2010a). One unidentified duck was found as a fatality at Leaning Juniper I Wind Power Facility during the two-year monitoring study (Gritski et al., 2008a). Fatality monitoring at Klondike III recorded no waterfowl fatalities, despite numerous groups of Canada geese recorded on the project area during avian use studies conducted concurrently with fatality monitoring (Gritski et al., 2010). One bufflehead was found at the Klondike II Wind Project (NWC and WEST, 2007). Three great-blue herons have been found as fatalities at regional wind projects (Klondike III, Gritski et al., 2010; Stateline and Nine Canyon; Erickson et al., 2003a; Erickson et al., 2004). Other waterbird species that have been found at wind projects in the Northwest include American coot, mallard, western grebe, horned grebe, and Virginia rail (Table 2).

The only waterfowl observed at West Butte Wind Project were two Canada geese, which flew over together during a winter season avian use survey (Table 2 in Gerhardt et al., 2008). Given this low use of the Project area and the fact that waterfowl are not very susceptible to collision with turbines, waterfowl are at *low risk* of collision at the West Butte Wind Project.

No wading birds were observed during surveys at West Butte, and no habitat exists within the Project boundary. Wading birds are deemed to be at *low risk* of collision at the West Butte Wind Project.

2.2.4 Shorebirds

Shorebirds are considered to be at *low risk* of collision. No shorebirds were detected during the surveys conducted at West Butte. As a group, shorebirds are rarely killed at wind

projects, even at those where their presence is documented during pre-construction surveys.

2.2.5 Upland Gamebirds

Some upland game bird mortality has been documented at wind projects (Erickson et al., 2001; Erickson et al., 2004). It is not clear if these mortalities were caused by striking turbine towers or blades, but there are also likely some strikes with vehicles traveling through the wind projects. Based on habitat present, results from other regional wind projects, and the presence of a few gamebirds—California quail, mountain quail, and chukar—within the West Butte Wind Project area, there is potential for mortality of some upland gamebirds to occur. One special status upland gamebird species, greater sage-grouse, is discussed below.

2.3 Impacts to Special Status Vertebrate Wildlife Species

This section discusses potential direct and indirect impacts of the construction and operation of the Project to special status avian species and other species of vertebrate wildlife. Bats are discussed in their own section below. For all avian species, risk could vary year-to-year for the life of the operating Project, depending on the level of nesting in the general area, prey availability, and regional and migrant population trends.

2.3.1 Special Status Raptors

The *golden eagle* (Bald and Golden Eagle Protection Act) is considered at *low risk* of collision. Golden eagles are known to collide with turbines at wind projects (Erickson et al., 2001); one was recently found as a fatality near the Goodnoe Hills in Washington (URS, 2010). Three or four dead golden eagles have been recently found at the Elkhorn Valley Wind Farm in Union County, Oregon (Rautenstrauch, 2010, cause of death still being investigated). The Elkhorn Valley Wind Farm is not within the CPE physiographical area, but is located within the Blue Mountain Ecoregion (Jeffrey et al., 2009b). Otherwise, despite the presence of golden eagles and their nests at and near many of them, other operational wind projects in the Northwest have not had documented eagle fatalities. Moreover, pre-construction use of Elkhorn Valley Wind Farm by golden eagles was significantly higher than that at other projects, with 136 detections during three seasons of preconstruction avian use studies (WEST, 2005). By contrast, a full year of avian use studies at West Butte resulted in one golden eagle detection (Table 2 in Gerhardt et al., 2008).

At the Foote Creek Rim Phase II Wind Project in Wyoming, where there is year-round golden eagle use and nesting, one fatality was documented during a study conducted from July 1999 to December 2000 (Young et al., 2003b). In addition, no golden eagle fatalities were documented during a one-year carcass survey at the Condon Wind Project in Oregon (Fishman, 2003) or documented incidentally after the formal survey, even though 25 detections were recorded during the one-year formal pre-construction surveys and though nesting occurred in the John Day River Basin within 10 to 12 miles (19.3 km) of that project.

At West Butte, two historical golden eagle nests were identified within 2 miles of the Project boundary during the 2008 raptor nest survey (Gerhardt and Gritski, 2008); both were inactive at the time of their discovery. Both were surveyed from the air again in 2009 (Gerhardt et al., 2010), and both were again inactive (though in each year, the late-May survey dates may have missed a breeding attempt that had already failed). In 2010, both nests were monitored from the ground; on the nest approximately 2 miles west of the Project boundary there was an incubating adult on April 1 and again on May 3. When monitored again on May 25, there were no eagles in the vicinity and no young or eggs in

the nest; the breeding attempt had failed (Gerhardt, Pers. Field Notes). At the second historical nest, there was no documented use during the three years of survey. During fall of 2009, the BLM conducted a prescribed burn in an area that included this nest. When monitored in spring of 2010, the nest tree was still green and most of the nest still intact. When checked again in late fall 2010, however, the nest was no longer intact, and the nest tree was clearly dying (Gerhardt, Pers. Field Notes). This nest tree is no longer viable as a golden eagle nest site.

During the year of avian use surveys, one detection of a golden eagle within a survey plot was recorded (Table 2 in Gerhardt et al., 2008). On three other occasions, an individual of this species was detected at distances outside the survey plots (and outside the area where turbines are proposed). In addition, a golden eagle was detected on four occasions while the surveyor was in-transit to surveys (Table 3 in Gerhardt et al., 2008); each of these was at the lower elevations associated with the access road (rather than on West Butte where turbines are planned).

The low use of West Butte by golden eagles is explainable with reference to their diet preferences and nest site selection. Neither the Project area nor West Butte itself contains any cliffs or rimrock, the preferred nesting substrate for golden eagles. The area does contain a small number of large ponderosa pines, which represent a secondary potential nest site, and two of these (within 2 miles of the Project boundary) did in fact contain stick nests built by golden eagles (before one of the nest trees died during a 2009 BLM prescribed burn). It remains uncertain whether these two nests were the only nests within this particular golden eagle territory, or whether other alternate nests exist for this territory outside the survey area. For golden eagles, the number of nests per territory ranges from 1 to 14, but is generally 2-3 (Kochert et al., 2002), and alternate nests can be as much as 5 km apart within a territory (McGahan, 1968). Moreover, some nests are never actually used, and yet may persist on the landscape for years or even decades.

Placement and productivity of golden eagle nests is believed to be associated with proximity to concentrations of prey. In much of the Great Basin, the primary prey—black-tailed jackrabbits—predominates in the diet. This is not the case in this portion of the species range, where jackrabbit populations are not of sufficient numbers to dominate the diet of breeding golden eagles. Instead, in this part of their range, golden eagles are more general in their diet, requiring a variety of prey species to successfully reproduce (Gerhardt, 2000). These include primarily medium to large mammal species, with medium to large birds being significant as well. But smaller mammals and birds, as well as snakes and fish, generally augment the diet at golden eagle nests at the northwestern edge of the Great Basin (Gerhardt, 2000).

Black-tailed jackrabbits occur near the Project area. However, they are likely less abundant and less accessible to eagles on West Butte itself than at the lower elevations surrounding it. On the main Project area—where most of the turbines are proposed—the density of the mountain big sagebrush is such that prey capture attempts by eagles on jackrabbits will succeed only infrequently.

Other species most important as prey of golden eagles were not encountered with any frequency on the Project area. At eight Central Oregon golden eagle nests studied in 1999-2000 (Gerhardt, 2000), the most frequent mammal and bird species eaten were yellow-bellied marmots, California ground-squirrels, and black-billed magpies. Marmots have been documented as the primary prey of golden eagles elsewhere in the Northwest (Marr and Knight, 1983). No California ground-squirrels were observed during surveys of the Project area, whereas both of the other species were observed infrequently at West Butte. The

Project area does not contain either the rocky outcrops or the irrigated fields that tend to concentrate marmots, nor does it provide the riparian habitat near which magpies breed. Of the three bird species most commonly eaten by golden eagles—ring-necked pheasants, gray partridge, and chukar (Olendorff, 1976)—only the latter was found at West Butte, and that only on one occasion (Gerhardt et al., 2008). West Butte likewise contains no pond, lake, riverine, or riparian habitat, and so offers none of the prey species associated with water that augment the diet of golden eagles in this region. Such prey species—found at nests of golden eagles in Central Oregon for which no habitat exists on West Butte—include mallard and other duck species, American coot, great blue heron, muskrat, and a variety of fish species (Gerhardt, 2000). And whereas regional prey remains studies documented snakes as prey at every nest studied (Gerhardt, 2000), no snakes were encountered during all surveys conducted in association with the West Butte Wind Power Project. Mountain cottontails were present but not abundant.

Thus, the Project area offers very poor hunting for golden eagles. As discussed below, greater sage-grouse use West Butte for lekking, nesting, brood-rearing, and summering, and may offer some opportunities for capture by golden eagles. In addition, three small colonies of Belding's ground-squirrels were found on the Project area. But these populations are likely insufficient for attracting breeding eagles, a conclusion supported by the very low use of the Project by eagles, as documented in the avian use study, and by the lack of productivity of the nearest eagle territory (Gerhardt et al., 2008, 2010).

Few raptors—and no golden eagles—were detected on the Project area during fall or winter (Gerhardt et al., 2008). Though West Butte rises above the surrounding landscape, its gentle slopes do not create reliable or steady updrafts that would concentrate migrating raptors, and no directed southward fall movement was detected. Indeed, any raptors observed soaring above West Butte utilize thermals and wind currents no different than those created over the surrounding lower elevations.

Harsh conditions in winter result in very low avian use of West Butte (Gerhardt et al., 2008); this consists almost entirely of Townsend's solitaire and common raven. The former are too small to be effectively captured by eagles, and the latter are only vulnerable to capture as nestlings and fledglings.

No eagle roosts were identified on the Project area. This is not surprising, as this species prefers to roost on cliffs near nests or foraging locations, and near the center of territories or areas of activity. A small number of nests (six) representing a small number of territories (perhaps two or three) are known from within ten miles of the Project area boundary (Gilbert, 2010). Based on the location of the known nests, the lack of use of the Project area, and the lack of concentrations of eagle prey species on the Project, West Butte likely functions as a boundary between rather widely separated golden eagle territories. Of the very few eagle observations recorded during all aspects of the site-specific studies, none involved the flight behaviors associated with territorial advertisement or defense.

Four detections of golden eagles were recorded while the surveyor was in transit to avian use and other surveys, and each of these detections occurred at the lower elevations associated with the access road and transmission line. Whereas golden eagles and other raptors have been known to suffer injury and death through electrocution or collision with transmission lines, impacts to raptors, including eagles, are not expected if transmission lines are constructed according to APLIC (2006) standards (M. Green pers. comm., 2010). At West Butte, proposed roads and transmission lines are far from any eagle nests, and no construction-related impacts to golden eagles or their nests are anticipated.

Populations, nest sites, and productivity of wildlife species are subject to change over time, and some of the conditions encountered on the Project area during the two years and more of pre-construction wildlife surveys represent only a snapshot in time. It is unlikely that West Butte will become significantly more suitable for nesting or foraging for golden eagles during the life of the West Butte Wind Power Project. The lack of ideal nest sites reflects the historical situation, and is dictated by the geology of the area. And while populations of some prey—like jackrabbits and ground-squirrels—can experience large fluctuations, the overall prey base of the Project area is not expected to significantly increase, being constrained by habitat limitations.

USFWS personnel have identified six geographic areas that should be avoided when siting new developments (Whittington et al., 2010); these are significant breeding areas, major migration routes, concentration areas, important wintering areas, communal roosts, and primary foraging areas. The West Butte Wind Project area includes none of these.

Based on the low eagle mortality at operating wind projects in the Northwest (with the exception of the high-eagle-use Elkhorn Valley Wind Project, if the dead eagles are turbine-collision related), the low use of the Project area by eagles, the lack of eagle or raptor migration through the Project area, and the lack of concentrations on the Project of eagle prey species, the proposed West Butte Wind Power Project is deemed to entail a low risk of mortality either to the nearest breeding eagles or to migrant or wintering eagles. Moreover, as the nearest breeding territory appears to be a marginal one (with no successful breeding attempts in the three years of monitoring), it is unlikely that the proposed Project will have a significant impact on the golden eagle population in the region. No nesting habitat will be directly impacted because nesting habitat is not present within the Project boundary.

Ferruginous hawk (State Sensitive-Vulnerable) is considered at *low risk* of collision. One active nest was found within the raptor survey area in 2009, and a cluster of alternate nests was found near this nest in both years in which raptor nest surveys were conducted (Gerhardt et al., 2008; 2010). This ferruginous hawk territory is near the Project's access road, approximately 5 miles from the nearest planned turbine. No ferruginous hawks were detected during the avian use surveys conducted on the portion of the Project where turbines are proposed (Gerhardt et al., 2008).

Ferruginous hawk has a history of collision at other wind projects in the Northwest (Table 3). From 2001 through 2010, there were five known ferruginous hawk fatalities at wind projects in the Columbia Plateau Ecoregion. These included fatalities at Willow Creek Winds Project (Gritski, 2010c), which had a nest density for this species of 0.25/mi^2 (Kronner et al., 2007b), and Leaning Juniper I (Gritski et al., 2008a), where 2004–2005 pre-construction avian use study analysis showed this species to have relatively high exposure for the site (Kronner et al., 2005a). A single fatality was documented at the Big Horn Wind Project in Washington (Kronner et al., 2008a), and two ferruginous hawks have been found as fatalities at the Stateline Wind Project, one during the fatality monitoring period from July 2001 through December 2003, and one during 2006.

Although ferruginous hawk is at low risk of collision with turbines at West Butte, road construction may cause disturbance to nesting in the identified ferruginous hawk territory (Figure 4 in Gerhardt et al., 2008). Such construction should be done outside the breeding season for this species, unless monitoring in the year of construction has demonstrated that breeding is either not occurring or is taking place more than 0.25 miles from construction activities.

The special status (State Sensitive-Critical) of ferruginous hawk at West Butte is an artifact of problematic ecoregion delineation. West Butte is part of the Blue Mountain Ecoregion of Oregon rather than part of the Northern Basin and Range Ecoregion (ODFW 2008). Demographically, however, shrub-steppe species breeding at West Butte—including ferruginous hawk, loggerhead shrike, and sage sparrow—are undoubtedly contiguous with populations breeding in the adjacent Northern Basin and Range rather than with populations distant to the northeast in the Blue Mountain Ecoregion. Though each of these species has special State status in the latter ecoregion, none has special State status in the former, which begins just a few miles south of West Butte (ODFW 2008). Ferruginous hawk is, nonetheless, a Federal Species of Concern.

2.3.2 Special Status Upland Gamebirds

For *Greater sage-grouse* (State Sensitive-Vulnerable), the risk of collision and/or of impacts due to displacement effects associated with the Project's construction and operation are *unknown, but potentially moderate*. This designation is based upon the presence of this species on the Project area and the current lack of empirical information regarding impacts to sage-grouse of wind energy developments.

Greater sage-grouse have a federal status of "Warranted but Precluded." The species' State status at West Butte is problematic. West Butte itself lies within the Blue Mountain Ecoregion (ODFW, 2008), where sage-grouse are considered State Sensitive-Vulnerable. This ecoregion delineation is artificial and inappropriate, however, for shrub-steppe species generally and for sage-grouse in particular. Ecologically and demographically, sage-grouse populations at West Butte are part of the metapopulation of the western Northern Basin and Range Ecoregion, where the species has no special State status (ODFW, 2008). That is, greater sage-grouse that spend portions of the year on and near the West Butte Wind Project spend other parts of the year to the south (Hanf et al., 1994), where their ecoregion designation, State status, and (in most years) hunting status change.

Greater sage-grouse have experienced substantial declines, both nationally and locally. Four leks in the vicinity of West Butte for which long-term monitoring data are available experienced declines from an average of 62 males per lek in 1950 to 30 males per lek in 1960 and to 11 males per lek in 1993 (Hanf et al., 1994). At the West Butte lek itself, the number of males dropped from 18 in 1988 to three in 1993 (Hanf et al., 1994); during pre-construction surveys for the West Butte Wind Project, three and four males continued to occupy the lek in 2008-2010 (Gerhardt et al., 2008; 2010).

As with other prairie grouse, concern about impacts of wind turbines to sage-grouse involves the potential for displacement from suitable habitat (NWCC, 2010). Sage-grouse exhibit high site fidelity during all stages of their life histories, and prefer extensive shrub-steppe habitat with little or no trees or other vertical structure. Although no empirical data are available regarding interactions between greater sage-grouse and wind turbines, lesser prairie-chickens have been known to avoid oil and gas platforms (Robel et al., 2004), and there is concern that sage-grouse may behave similarly with regard to wind turbines (NWCC, 2010).

Another factor in the local decline of sage-grouse is thought to be encroachment by juniper on otherwise suitable habitat. It is expected that continued aggressive efforts at juniper removal on West Butte will be performed as mitigation for development of the Project, as suggested by ODFW sage-grouse specialist C. Hagen (2008).

2.3.3 Special Status Passerines

Loggerhead shrike (State Sensitive-Vulnerable) is considered to be at *low risk* of collision with turbines; this is due both to its low mean use at West Butte and its apparent low susceptibility to such collision. This species occurs throughout the U.S. where wind projects have been built, yet only two loggerhead shrikes (both in California) have been reported as fatalities at wind power facilities (Erickson et al., 2001). This species was detected once during avian use surveys of the portion of West Butte where turbines are proposed, and two nests were confirmed within the special status wildlife survey corridors associated with the access road (Gerhardt et al., 2008).

As with ferruginous hawk and greater sage-grouse (discussed above), it is more appropriate to consider the loggerhead shrikes breeding at West Butte as part of the populations of the Northern Basin and Range Ecoregion (where they have no special State status) than as part of populations in the Blue Mountain Ecoregion (in which the State Sensitive-Vulnerable designation applies).

2.3.4 Special Status Mammals

Pygmy rabbit (State Sensitive-Vulnerable) No habitat exists for this species anywhere on the Project area, and so no impacts to pygmy rabbits are anticipated. There were reports of pygmy rabbits on land administered by the Bureau of Land Management just south of the Project boundary. These sightings were in 'non-typical habitat' (J. Hanf pers. comm., 2009). Throughout surveys conducted on the Project, including during spring to early summer special status wildlife species surveys of the portions of the hillside below which pygmy rabbit was reported, all lagomorph pellets and sign were consistent with mountain cottontail, a species known to be in the area. Moreover, none of the habitat on the Project is of the kind that would trigger surveys specifically for pygmy rabbit (Gabler et al., 2000; Ulmschneider, 2004).

Potential impacts of the Project to special status bat species are discussed below.

2.3.5 Other Special Status Wildlife

Sagebrush lizard (State Sensitive-Vulnerable) This species was encountered in sandy areas of the Project and along the access road. This reptile was generally associated with sandy areas containing sage, and was usually found on south-facing slopes. A small amount of habitat loss may occur in association with the Project facilities, including turbines and roads. Potential for vehicle runovers on the project roads may occur over the life of the project.

2.4 Impacts to Other Vertebrate Wildlife

Potential impacts to other wildlife, including nonlisted mammals, amphibians, and reptiles are not expected to be substantial.

No measurable impacts are anticipated to big game from operations. Much of the Project is designated by ODFW as winter deer and elk range. Actual use of the Project area by deer is currently low, with a maximum of 15 animals seen during all wildlife and plant surveys conducted at West Butte. No elk were encountered during these surveys, whereas pronghorn were encountered in the lower elevations associated with the proposed road access, particularly during spring (Gerhardt et al., 2008).

More importantly, operation of wind turbines is generally not considered to constitute a negative impact upon big game, with a wealth of evidence supporting this conclusion. Most of this evidence is anecdotal, as at the Big Horn Wind Project in Washington, where very young mule deer fawns (only a few days to a week old) were observed on eight occasions in

May and June during post-construction wildlife fatality monitoring conducted on turbine search plots, indicating that mule deer birthing activities occurred near turbines (NWC, 2007). So plentiful is such anecdotal information that scientific studies have been few. The few such studies, however, tend to bear out the conclusion that wind energy development is not harmful to big game. At the Foote Creek Rim Wind Project in Wyoming, pronghorn use within 800 meters of the site did not change significantly after construction (Johnson et al., 2000). A single study in Union County, Oregon, suggested that more deer and elk congregated at greater distances from turbines after construction than they had from those same areas during pre-construction surveys (Jeffrey et al., 2010). Confounding evidence—including greater density estimates on the study area of both deer and elk post-construction—led the researchers to say that their results were inconclusive with regard to impacts to big game (Jeffrey et al., 2010).

Some game species may be temporarily displaced during construction, as has been noted at other wind projects, but this displacement is not expected to be permanent. A small amount of high-quality foraging habitat will likely be permanently lost in association with the Project's footprint. This loss is expected to be addressed with mitigation measures.

Construction may also result in loss of foraging and breeding habitat for nonlisted small mammals, such as northern pocket gopher and Ord's kangaroo rat. Ground-dwelling mammals will lose the use of the permanently affected areas; however, they are expected to repopulate the temporarily affected areas. Some small mammal fatalities can be expected from vehicle activity during operations, but impacts are expected to be very low. No impacts to amphibians are anticipated during operations; no aquatic habitat impacts are anticipated. Impacts to reptiles during operation are likely to be limited to direct mortality as a result of vehicle collisions and are expected to be low, provided that recommended speed limits are followed. No snakes were found on the Project during the course of any of the studies.

2.5 Impacts to Bats

The primary impact to bats will be through interactions with turbines resulting in direct mortality (turbine collision) or barotrauma. Available local and regional evidence indicates that this will be confined primarily to the migratory species. Throughout the Northwest, fatalities have been comprised primarily of silver-haired and hoary bats, with fall being the main season of fatalities and spring and summer seasons contributing only small numbers of fatalities (Figure 3). Data from 19 wind projects in the Northwest (Figure 3) show that 86% of 534 total bat fatalities found and identified at these projects have been found during August–October (with the peak in September) and >97% of all of these bat fatalities were hoary or silver-haired bats (259 hoary bats and 261 silver-haired bats identified as fatalities).

Different bat species face quite different risks of colliding with operating wind turbines. While some of this variance may be associated with factors such as agility, it is increasingly apparent that it is flight height tendencies that make some species more vulnerable than others. Of the five species positively identified on the West Butte Wind Power Project, four—small-footed myotis, long-eared myotis, little brown myotis, and Townsend's big-eared bat—generally fly relatively close to the ground (below the rotor-swept area). Of the four, only the little brown bat has been encountered as fatalities under wind turbines, and that only infrequently (Kunz et al. 2007). Two tentatively-identified species, California myotis and Yuma myotis, are also low-flying bats not documented as fatalities at wind projects. The other species positively identified on the Project, pallid bat, flies somewhat higher but has not been documented as a fatality in regional studies. Special status bat species are discussed below.

Although 46 species of bats occur in the United States, 11 species comprise all known bat fatalities at U.S. wind plants (Johnson, 2005), despite the fact that wind projects occur in several regions of the country in a variety of habitats. The three most common species of migratory bats in the U.S. (hoary, eastern red, and silver-haired bats) comprised 73% of 2,486 bat fatalities identified to species at 14 U.S. wind projects (Kunz et al., 2007). At a wind farm in Wisconsin, veterinary analysis of bat carcasses found during monitoring to further understand the cause of death in bats killed by wind turbines found that bats were killed by both blunt force trauma and barotraumas, and some fatalities were a combination of the two (Grodsky et al., 2010) This is consistent with other studies on the cause of mortality of bats at operating wind projects (Baerwald et al., 2008).

Bat species composition of fatalities at West Butte is likely to be similar to fatalities found elsewhere in the Pacific Northwest (Figure 3), consisting primarily of silver-haired and hoary bats (both State Sensitive-Vulnerable). Small numbers of other bat species, such as big brown bat (Kronner et al., 2008a), little brown bat (Erickson, et al., 2004), and other *Myotis* species (Appendix D) have been found at regional wind projects and may also be found as fatalities at West Butte. As with other projects in the Northwest, most bat mortality would be expected to occur from July through early fall, coinciding with the fall migration period for hoary and silver-haired bats, with the exception of a few fatalities found during May and June (Figure 3). At Leaning Juniper I, four silver-haired bats were found as fatalities during May despite there being no suitable (forested) breeding habitat nearby; these may have been individuals temporarily residing in lower warmer elevation zones before going to mountainous areas for the summer. In December, one hoary bat was found as a fatality at Leaning Juniper I as an incidental (Gritski et al., 2008a). At Pebble Springs, one silver-haired bat was found as a fatality (incidental) in late April, one in late May, two bats were found in mid-June, a hoary bat and an unidentified bat and two were found incidentally in November, a hoary bat and a silver-haired bat (Gritski and Kronner, 2010). During the first year of wildlife monitoring at the Rattlesnake Road Wind Farm, only one bat was found outside of the July through early fall period, a hoary bat found in November (Gritski, 2010a).

Bat mortality patterns at wind projects in Washington and Oregon have followed patterns similar to the rest of the country, but the average is slightly lower (NWCC, 2004; Arnett et al., 2008). Bat fatality rates at West Butte are expected to be lower than fatalities at many other wind projects in the United States, particularly lower than projects in the eastern U.S. where bat mortality at some projects has ranged from 28 to over 40 per turbine per year (Kerns and Kerlinger, 2004; Nicholson, 2003; Arnett et al., 2008).

Bats typically have low reproductive rates, are not long-lived, and appear to be especially vulnerable to wind turbines. Additionally, although most wind projects in the Northwest, Rocky Mountains, and upper Midwest where the habitat is open prairie and farmland have 1–3 bat fatalities/turbine/year (NWCC, 2004; Arnett, 2005; Johnson, 2005), the number of bat kills becomes more significant as the number of operating turbines increases nationwide into the thousands (Arnett, 2005). Bat Conservation International (BCI), the American Wind Energy Association (AWEA), the USFWS, and the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) have initiated a research effort (the Bat Wind Energy Cooperative) to understand bat and wind turbine interactions and how bat fatalities can be prevented or minimized.

2.5.1 Special Status Bats

For *Pallid bat* (State Sensitive-Vulnerable, Federal Species of Concern), the risk of barotrauma or collision with turbines is *unknown but potentially moderate*. This species

generally forages near the ground, but may fly higher when dispersing and migrating. Pallid bat is not a species that has been documented as a fatality at wind farms. Its risk of collision remains unknown, however, because its presence has not been documented at wind energy sites where post-construction fatality monitoring has been conducted. This species was positively identified as present at West Butte during bat inventory studies (Gerhardt et al., 2008).

Townsend's big-eared bat (State Sensitive-Critical, Federal Species of Concern) is considered to be at *low risk* of turbine collision or barotrauma. This species was positively identified as present at West Butte during bat inventory studies (Gerhardt et al., 2008). This species has not been encountered as a fatality at wind energy facilities, even where it has been encountered during pre-construction surveys (subspecies Virginia big-eared bat; Johnson and Strickland, 2003); moreover, it is non-migratory and forages at heights below the rotor-swept area, both of which are characteristics that make it unsusceptible to interaction with wind turbines.

Silver-haired bat (State Sensitive-Vulnerable, Federal Species of Concern) is considered to be at *moderate to high risk* of collision with turbines and/or barotrauma. Tentatively identified as present at West Butte (Gerhardt et al., 2008), this is a high-flying, migratory species that is known to collide with turbine rotors. Silver-haired bats account for at least 30% of bat fatalities at those wind energy projects in the Columbia Plateau where post-construction fatality monitoring has been conducted (Kunz et al. 2007). The impacts of turbine collisions to the species as a whole or to regional populations are unknown.

Hoary bat (State Sensitive-Vulnerable, Federal Species of Concern) is considered to be at *moderate to high risk* of collision with turbines and/or barotrauma. Although not identified during bat inventory studies at West Butte (Gerhardt et al., 2008), this is a high-flying, migratory species that is known to collide with turbine rotors at operating wind farms, even those at which it is not detected during pre-construction surveys. Hoary bats account for at least 60% of bat fatalities at those wind energy projects in the Northwest where post-construction fatality monitoring has been conducted (Kunz et al. 2007). The impacts of turbine collisions to the species as a whole or to regional populations are unknown.

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4.0 TABLES

Table 1. Estimated raptor nest densities at West Butte and other regional proposed and existing wind projects (studies with similar methods).

Project Site**	Raptor Nest Density (# / mi^2), rounded							
	All Raptor Species Combined	Buteos				Eagle	Falcon	Owl
		SWHA	RTHA	FEHA	UNBU	GOEA	PRFA	GHOW
Willow Creek Winds, OR	0.80	0.44	0.07	0.25	0.00	0.00	0.00	0.04
Rattlesnake Road, OR	0.45	0.19	0.13	0.05	0.00	0.00	0.08	0.00
Hopkins Ridge, WA	0.42	0.01	0.27	0.01	0.05	0.00	0.00	0.08
Leaning Juniper IIA, OR	0.41	0.18	0.16	0.03	0.00	0.00	0.02	0.02
Leaning Juniper IIB, OR	0.40	0.19	0.13	0.06	0.00	0.00	0.02	0.00
Wheat Field, OR	0.26	0.06	0.12	0.03	0.00	0.00	0.06	0.00
Golden Hills, OR	0.25	0.04	0.16	0.00	0.00	0.00	0.00	0.05
Klondike I and II, OR (5 mile radius survey area)	0.23	0.07	0.11	0.00	0.00	0.01	0.00	0.04
Stateline OR/WA	0.21	0.03	0.08	0.03	0.00	0.00	0.00	0.07
Klondike III, OR	0.20	0.04	0.11	0.00	0.01	0.00	0.00	0.03
Wild Horse, WA	0.16	0.00	0.12	0.00	0.00	0.00	0.02	0.02
Klickitat County, WA	0.12	0.00	0.09	0.00	0.00	0.00	0.01	0.03
Big Horn, WA	0.11	0.00	0.06	0.00	0.00	0.00	0.01	0.04
West Butte, OR	**0.07**	**0.00**	**0.04**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**
AVERAGE (not including West Butte)	0.30							

Note: American kestrel, short-eared owl, and burrowing owl are omitted due to difficulty in determining nesting of these species with the raptor nest survey method (helicopter survey) employed in this and other studies; Cooper's hawk nest included in West Butte density value (but not broken out separately since not encountered at other projects).

Codes:

SWHA = Swainson's hawk
RTHA = red-tailed hawk
FEHA = ferruginous hawk
GOEA = golden eagle
PRFA = prairie falcon
GHOW = great-horned owl
UNBU = unknown species of the genus *Buteo*

* Studies with similar study methods. Arid grassland and shrub-steppe environments with extensive dryland wheat, non-native grassland (CRP), and narrow riparian corridors in some drainages.

** References for projects: Big Horn (Johnson and Erickson, 2004), Leaning Juniper II (Kronner et al., 2005a), Klondike I and II (Johnson et al., 2002a), Klondike III (Mabee et al., 2005), Golden Hills (Jeffrey et al., 2008), Stateline (Erickson et al., 2004; NWC and WEST, 2001), Klickitat County (Johnson et al., 2003b), Hopkins Ridge (Young et al., 2003a), Wild Horse (Erickson et al., 2003b), Rattlesnake Road (Kronner et al., 2007a), Wheat Field (Kronner et al., 2008b); Pebble Springs (Gritski and Kronner, 2010); Willow Creek Winds (Kronner et al., 2007b).

*** Post-construction study of operating project

Other data not listed above:

Montague Wind Power Facility: Approximately 35% of the 192.65 mi^2 raptor survey buffer was surveyed in 2009. A total of 42 active raptor nests were found including 18 SWHA, 11 RTHA, 10 FEHA, 2 PRFA, and 1 long-eared owl nest (NWC, 2010b)

Shepherds Flat Wind Farm nest densities from ground-based field surveys: For 122 square mile 2003 study area: all raptor species combined – 0.11, RTHA – 0.057, FEHA – 0.0082, GHOW – 0.016, GOEA – 0.016, SWHA – 0.0082. Email letter from Pilz and Co. to Oregon Dept. of Energy dated October 25, 2007. Shepherd's Flat Wind Farm Application Supplement dated November 19, 2007.

Saddle Butte Wind Park: "Eight occupied raptor nests found on the facility or in its vicinity. One, a SWHA is within the site boundary (page G-18). Two nests are outside of the boundary but within the study area – one SWHA and one RTHA. The remaining five nests are all RTHA" (Saddle Butte Wind, 2009).

Table 2. Annual fatality estimates on a per turbine and per MW nameplate basis for all birds and for all raptors in the Northwest where fatality monitoring studies have been completed.

Columbia Plateau Ecoregion Wind Project [1]	All Bird Fatality Rates		Raptor Fatality Rates [2]	
Listed in order of highest to lowest All Bird Fatality Rate per MW/Year	# / MW	# / Turbine	# / MW	# / Turbine
Leaning Juniper I, OR[5]	6.7	10.0	0.21	0.32
Tuolumne, WA	3.2	7.1	0.29	0.63
Klondike II, OR	3.1	4.7	0.11	0.17
Klondike III, OR (Phase 1)	3.0	5.3	0.15	0.26
Hopkins Ridge I, WA (2008)	3.0	5.4	0.07	0.12
Stateline I and II, WA/OR	2.9	1.9	0.09	0.06
Nine Canyon I, WA[3]	2.8	3.6	0.05	0.07
Combine Hills, OR	2.6	2.3	0.00	0.00
Big Horn, WA[5]	2.5	3.8	0.15	0.23
Biglow Canyon, OR (2009)	2.5	4.1	0.04	0.06
Klondike IIIa, OR (Phase 2)[4]	2.3	3.5	0.00	0.00
Pebble Springs, OR	1.9	4.1	0.04	0.08
Biglow Canyon, OR (2008)	1.8	2.9	0.03	0.06
Wild Horse, WA[4]	1.6	2.8	0.09	0.17
Goodnoe Hills, WA	1.4	2.8	0.17	0.34
Hopkins Ridge I, WA (2006)	1.2	2.2	0.14	0.25
Vansycle, OR	1.0	0.6	0.00	0.00
Klondike I, OR	0.9	1.4	0.00	0.00
Mean	**2.47**	**3.80**	**0.09**	**0.16**

[1] References for projects (listed alphabetically by name): Big Horn (Kronner et al., 2008a), Biglow Canyon Phase I (Jeffrey et al., 2009a; Enk et al., 2010), Combine Hills (Young et al., 2006), Goodnoe Hills (URS, 2010); Hopkins Ridge I (Young et al., 2007, 2009), Klondike I (Johnson et al., 2003a), Klondike II (NWC and West, 2007), Klondike IIIa (Gritski et al., 2009a); Klondike III (Gritski et al., 2010), Leaning Juniper I (Gritski et al., 2008a), Nine Canyon (Erickson et al., 2003a), Pebble Springs (Gritski and Kronner, 2010), Stateline I and II-partial (Erickson et al., 2004), Tuolumne (Enz and Bay, 2010), Vansycle (Erickson et al.,2000), Wild Horse (Erickson et al., 2008).

[2] Raptor estimates include diurnal raptors and owls.

[3] Nine Canyon II monitored only part-year.

[4] Wild Horse and Klondike IIIa estimates include only data for the first year of the respective 2-year studies.

[5] Huso estimator used to determine estimated fatality rates for Leaning Juniper I and Big Horn wind projects (Gritski et al., 2008a; Kronner et al., 2008a). For rates calculated using Huso estimator for KIII and KIIIa see Gritski et al., 2009a and Gritski et al., 2010.

Table 3. Number and species composition of bird fatalities found at wind projects in the Northwest where fatality monitoring studies* have been completed or are in progress (data obtained from public files).

Species	% Composition (Includes Scheduled Searches Only)	Number of Fatalities Found on Scheduled Searches	Number of Fatalities Found as Incidentals**
horned lark	31.2	332	37
golden-crowned kinglet	5.8	62	2
ring-necked pheasant (n)	5.4	57	15
gray partridge (n)	4.5	48	2
western meadowlark	3.2	34	2
chukar (n)	3.0	32	4
European starling (n)	2.7	29	3
American kestrel	2.6	28	10
dark-eyed junco	2.5	27	5
mourning dove	2.4	26	1
unidentified passerine	2.3	24	3
white-crowned sparrow	2.1	22	3
unidentified bird	2.0	21	2
Townsend's warbler	1.9	20	0
yellow-rumped warbler	1.6	17	2
red-tailed hawk	1.4	15	10
rock pigeon (n)	1.3	14	1
winter wren	1.3	14	1
ruby-crowned kinglet	1.2	13	2
northern flicker	1.0	11	1
American robin	0.8	9	1
savannah sparrow	0.8	9	0
red-breasted nuthatch	0.8	8	0
short-eared owl	0.8	8	1
unidentified kinglet	0.8	8	0
warbling vireo	0.7	7	0
black-billed magpie	0.6	6	0
house wren	0.6	6	0
Brewer's sparrow	0.5	5	4
Canada goose	0.5	5	1
common nighthawk	0.5	5	5
golden-crowned sparrow	0.5	5	0
unidentified sparrow	0.5	5	0
Cassin's vireo	0.4	4	0
common raven	0.4	4	0
great-horned owl	0.4	4	0
Swainson's hawk	0.4	4	6
American coot	0.3	3	0
great blue heron	0.3	3	0
house sparrow (n)	0.3	3	1
mallard	0.3	3	0
orange-crowned warbler	0.3	3	0
song sparrow	0.3	3	1
spotted towhee	0.3	3	2
unidentified buteo	0.3	3	0
unidentified duck	0.3	3	0
unidentified vireo	0.3	3	0
unidentified warbler	0.3	3	0
Vaux's swift	0.3	3	2

Species	% Composition (Includes Scheduled Searches Only)	Number of Fatalities Found on Scheduled Searches	Number of Fatalities Found as Incidentals**
vesper sparrow	0.3	3	1
western tanager	0.3	3	0
American goldfinch	0.2	2	0
barn owl	0.2	2	1
chipping sparrow	0.2	2	0
common yellowthroat	0.2	2	0
downy woodpecker	0.2	2	0
ferruginous hawk	0.2	2	3
house finch	0.2	2	1
Lincoln's sparrow	0.2	2	0
long-eared owl	0.2	2	0
MacGillivray's warbler	0.2	2	1
northern harrier	0.2	2	1
northern rough-winged swallow	0.2	2	0
pine siskin	0.2	2	0
rough-legged hawk	0.2	2	3
sage thrasher	0.2	2	0
sharp-shinned hawk	0.2	2	0
Virginia rail	0.2	2	0
white-throated swift	0.2	2	2
Wilson's warbler	0.2	2	0
American pipit	0.1	1	0
ash-throated flycatcher	0.1	1	0
black-throated sparrow	0.1	1	0
Brewer's blackbird	0.1	1	0
brown-headed cowbird	0.1	1	0
California quail	0.1	1	0
common poorwill	0.1	1	0
Cooper's hawk	0.1	1	0
golden eagle	0.1	1	0
grasshopper sparrow	0.1	1	0
gray flycatcher	0.1	1	0
hairy woodpecker	0.1	1	0
Hammond's flycatcher	0.1	1	0
hermit thrush	0.1	1	1
horned grebe	0.1	1	0
killdeer	0.1	1	0
Lewis's woodpecker	0.1	1	0
long-billed curlew	0.1	1	0
merlin	0.1	1	0
mountain bluebird	0.1	1	1
northern pintail	0.1	1	0
purple finch	0.1	1	0
red-winged blackbird	0.1	1	0
Swainson's thrush	0.1	1	0
Townsend's solitaire	0.1	1	0
tree swallow	0.1	1	0
unidentified accipiter	0.1	1	0
unidentified flycatcher	0.1	1	0
unidentified thrush	0.1	1	0
varied thrush	0.1	1	0
western grebe	0.1	1	1
western kingbird	0.1	1	0

Species	% Composition (Includes Scheduled Searches Only)	Number of Fatalities Found on Scheduled Searches	Number of Fatalities Found as Incidentals**
western wood-pewee	0.1	1	0
white-breasted nuthatch	0.1	1	0
yellow warbler	0.1	1	0
American crow	0.0	0	1
bufflehead	0.0	0	1
gray catbird	0.0	0	1
prairie falcon	0.0	0	2
sage sparrow	0.0	0	1
turkey vulture	0.0	0	1
Williamson's sapsucker	0.0	0	1
Total (101 species identified) (95 native identified, 6 non-native)	**100.0**	**1,063**	**154**

* with similar study protocols n = non-native species

** not all project data was verified. Includes most, but not all incidentals found during formal monitoring studies, and one incidental found after monitoring was complete.

[1] Data from the following formal monitoring studies during the monitoring periods stated below. For full reference, see reference Section 6.0. These are observed fatalities and not final estimates of fatalities, which are higher.

Enk et al., 2010. Portland General Electric, Biglow Canyon Wind Farm Phase I, post-construction avian and bat monitoring, second annual report, January–December 2009.

Enz, T. and K. Bay. 2010. Post-construction avian and bat fatality monitoring study, Tuolumne Wind Project, Klickitat County, Washington. Final report: April 20, 2009 to April 7, 2010.

Erickson et al., 2000. Avian and bat mortality associated with the Vansycle Wind Plant, Umatilla County Oregon. 1999 study year.

Erickson et al., 2003a. Nine Canyon Wind Power Project avian and bat monitoring report, September 2002–August 2003.

Erickson et al., 2004. Stateline Wind Project wildlife monitoring final report, July 2001–December 2003.

Erickson et al., 2007. Stateline Wind Project wildlife monitoring annual report, January–December 2006.

Erickson et al., 2008. Wild Horse Wind Facility construction avian and bat monitoring first annual report, January–December, 2007.

Gritski B., 2010a. Rattlesnake Road Wind Farm – first annual wildlife monitoring study (January 2009–January 2010).

Gritski B., 2010b. Wheat Field Wind Farm – first annual wildlife monitoring study (May 2009–May 2010).

Gritski B., 2010c. Willow Creek Wind Project, results of the first year of wildlife fatality monitoring for the periods January 7, 2009 through February 9, 2010.

Gritski, B. and K. Kronner. 2010. Pebble Springs Wind Power Project wildlife monitoring study, January 2009–January 2010.

Gritski et al., 2008a. Leaning Juniper Wind Power Project, 2006–2008. Wildlife monitoring final report.

Gritski et al., 2008b. White Creek Wind I wildlife monitoring annual summary, winter 2007–2008 through fall 2008.

Gritski et al., 2009a. Klondike IIIa (Phase 2) Wind Power Project wildlife monitoring year one summary, August 2008–August 2009.

Gritski et al., 2009b. White Creek Wind I wildlife monitoring second annual summary, winter 2008-2009 through fall 2009.

Gritski et al., 2010. Klondike III (Phase 1) Wind Power Project wildlife fatality monitoring study, October 2007–October 2009.

Jeffrey et al., 2009a. Biglow Canyon Wind Farm Phase I post-construction avian and bat monitoring first annual report, January 2008–December 2008

Johnson et al., 2003a. Avian and bat mortality at the Klondike, Oregon Phase I Wind Plant, Sherman County, Oregon. February 2002–February 2003.

Kronner et al., 2008a. Big Horn Wind Power Project wildlife monitoring study, 2006–2007.

NWC and WEST. 2007. Avian and bat monitoring report for the Klondike II Wind Power Project, Sherman County, Oregon. August 2005–August 2006.

URS, 2010. Final Goodnoe Hills Wind Project avian mortality monitoring report. February 2009–January 2010.

Young et al., 2006. Eurus Combine Hills Turbine Ranch Phase 1 Post Construction Wildlife Monitoring First Annual Report February 2004–February 2005.

Young et al., 2007. Puget Sound Energy, Hopkins Ridge Wind Project Phase 1, post-construction avian and bat monitoring first annual report. January–December 2006.

Young et al., 2009. Puget Sound Energy, Hopkins Ridge Wind Project Phase 1, post-construction avian and bat monitoring, second annual report, January–December 2008.

5.0 FIGURES

Figure 1. Overall avian mean use at selected wind projects (pre-construction studies) in the Northwest, including West Butte Wind Project for comparison.

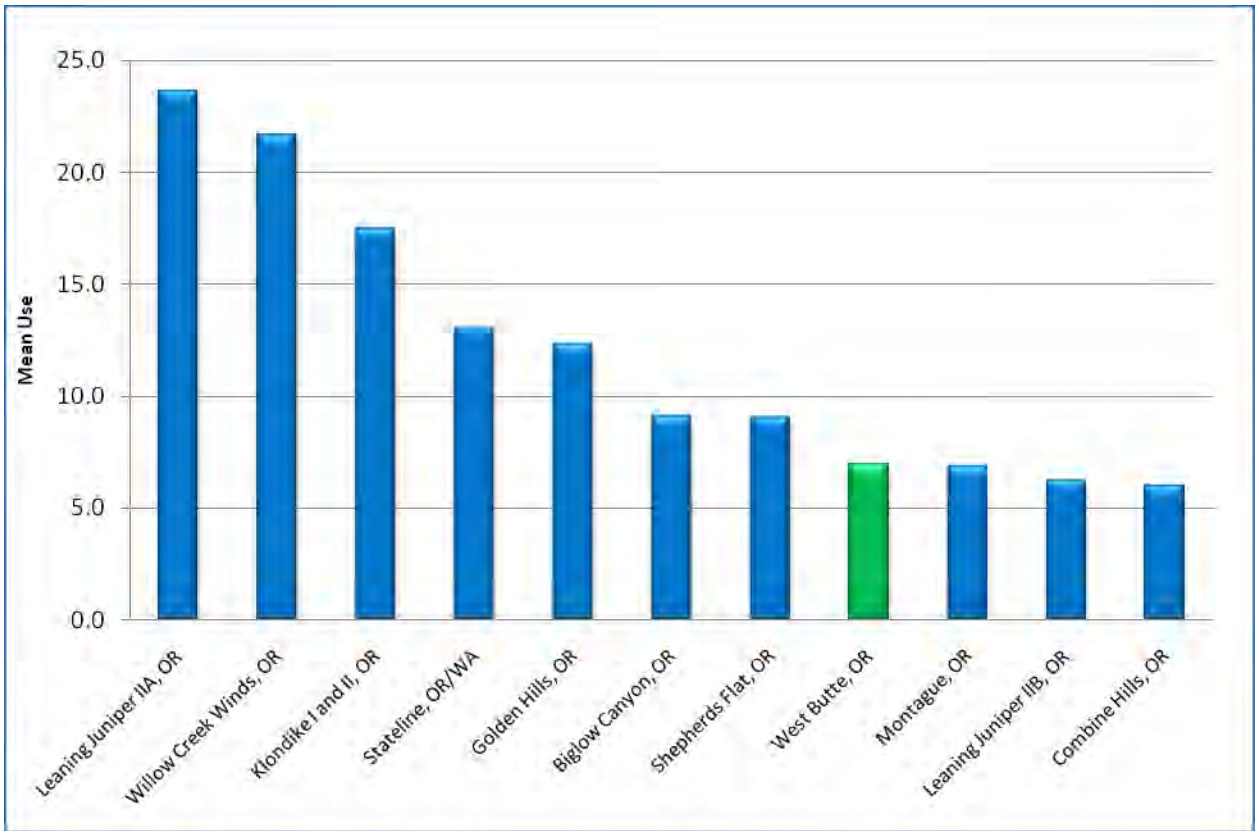


Figure 2. Overall raptor mean use at selected wind projects (pre-construction studies) in the Northwest including West Butte Wind Project for comparison.

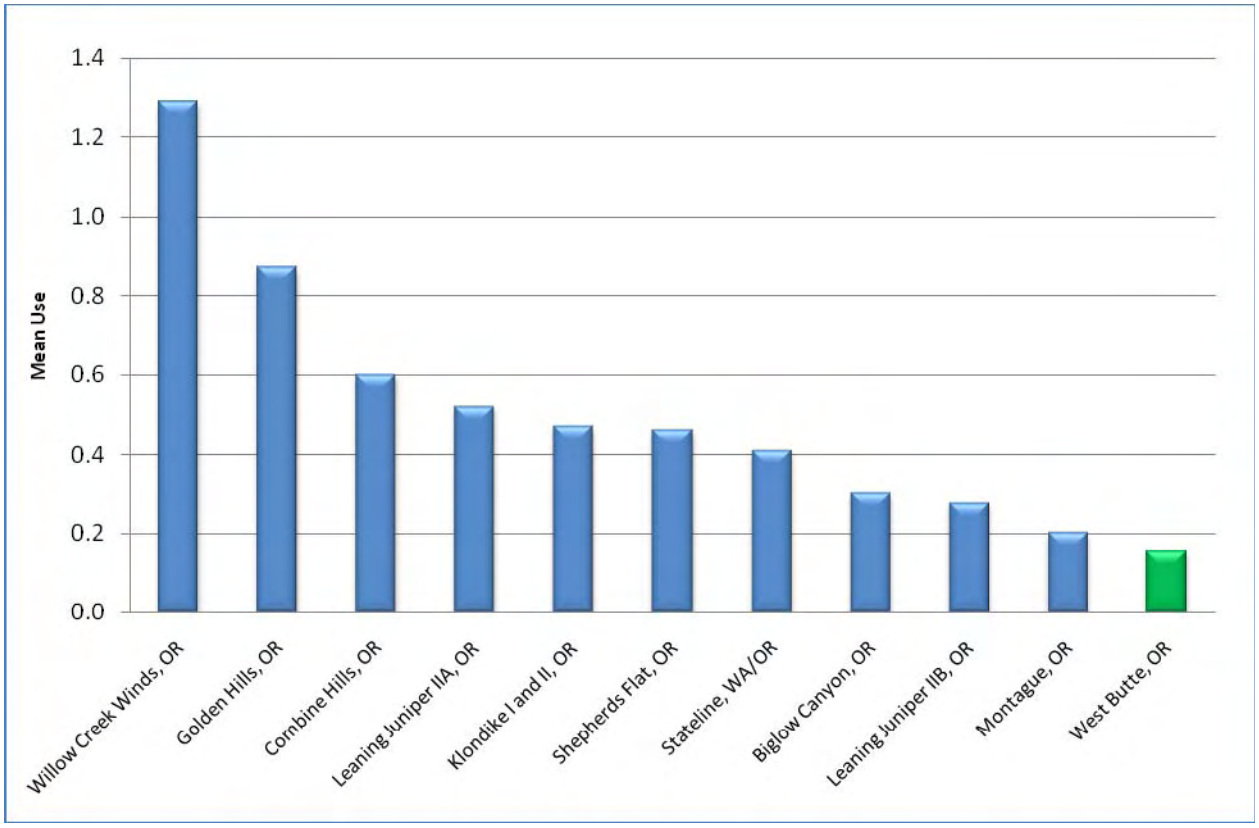
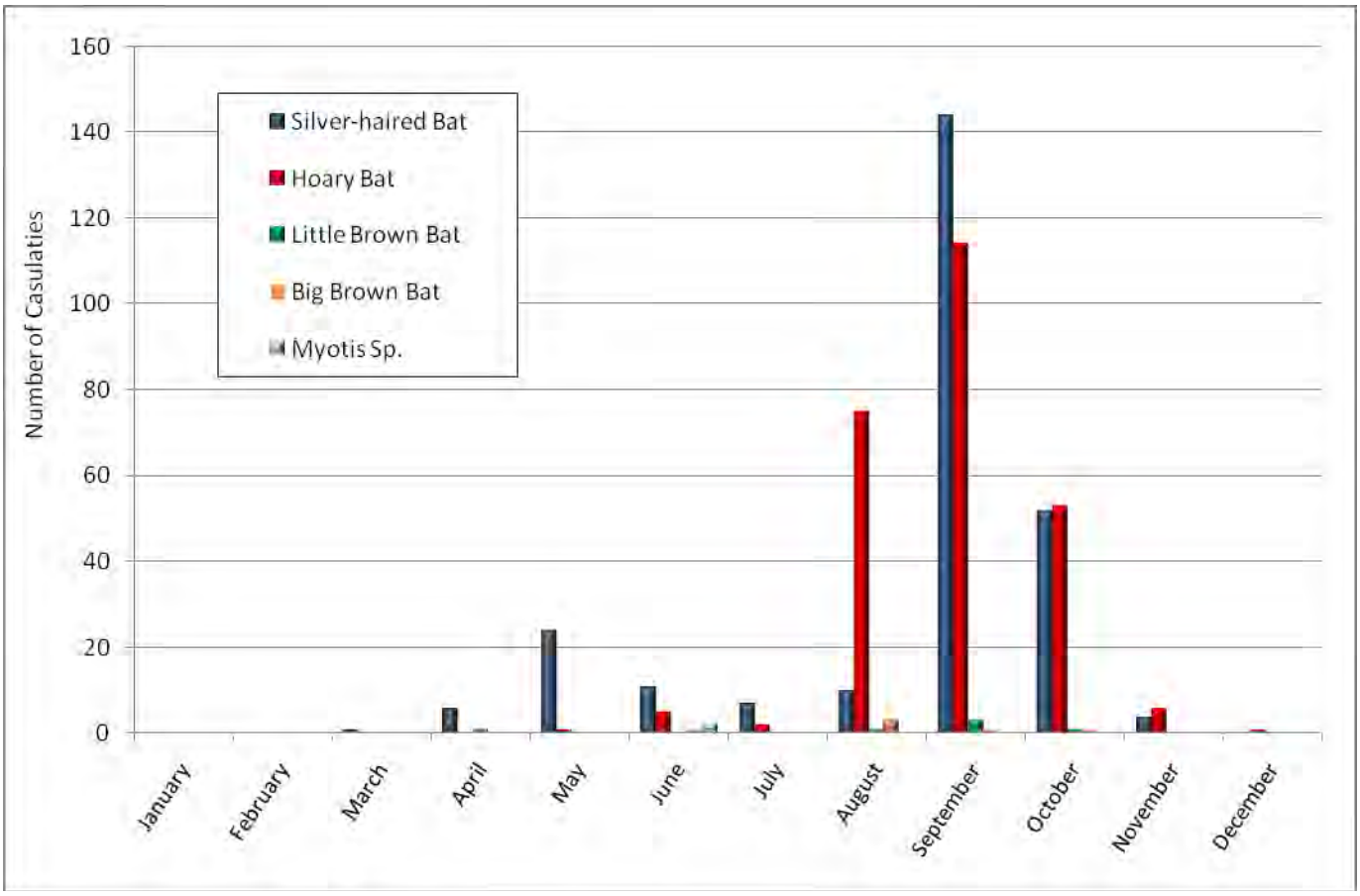


Figure 3. Bat fatalities by month at existing wind projects in the Pacific Northwest.*



*Data used are dates when bat fatality was discovered with no adjustment for age of carcass when found. Number of casualties represent observed casualties found (not adjusted estimates). Includes incidentals.

References for projects included: Stateline I and II-partial (Erickson et al., 2004); Vansycle (Erickson et al., 2000); Klondike I (Johnson et al., 2003); Klondike II (NWC and WEST, 2007); Klondike IIIa Year 1 (Gritski et al., 2009a); Klondike III (Gritski et al., 2010); Combine Hills (Young et al., 2006); Nine Canyon I (Erickson et al., 2003); Hopkins Ridge (Young et al., 2007); Big Horn (Kronner et al., 2008a); Wild Horse Year 1 (Erickson et al., 2008); Leaning Juniper I (Gritski et al., 2008a); Biglow Canyon (Jeffrey et al., 2009a) ; White Creek Wind I (Year 1-2 monitoring; Gritski et al., 2009b); Goodnoe Hills (URS, 2010), Pebble (Gritski and Kronner, 2010); Rattlesnake Road (Gritski, 2010a); Wheat Field (Gritski, 2010b); Willow Creek Winds (Gritski, 2010c).

Appendix B

Wildlife Monitoring Plan

for the

West Butte Wind Project

Wildlife Monitoring Plan

for the

West Butte

Wind Project

Crook County, Oregon

Prepared for:

West Butte Wind Power Project

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1.0 INTRODUCTION

1.1 Background and Study Purpose

This plan outlines the protocols to monitor for wildlife impacts to meet permit compliance requirements during operations of the West Butte Wind Power Project ("Project") located in Crook County, Oregon. West Butte Wind received a Conditional Use Permit (CUP) from Crook County Planning Department 2009 to construct and operate the Project. The permit specifies that an avian impact monitoring plan be prepared. During the Project permitting process the ODFW also requested that wildlife monitoring should be conducted. All the applicable requirements and suggestions have been incorporated in this August 2009 wildlife monitoring plan.

The monitoring protocol focuses on a period initially following construction; life of the Project reporting of wildlife fatalities will also occur. The primary objective of the wildlife monitoring study is to search for avian and bat casualties attributable to the operating wind Project and to monitor the activity status of raptor nests. The fatality estimates will be used to determine if projected impact levels for the Project are within acceptable ranges and are consistent with reported data from other wind projects in the state. Another monitoring component is conducting avian use displacement surveys at a portion of the monitored turbines where preconstruction surveys have previously been conducted and continued sage grouse lek surveys within the project area for the first five (5) years..

The plan also summarizes monitoring protocols and acts as technical reference for study personnel, and describes wildlife handling and reporting practices for operations personnel during the study year and for the life of the Project.

1.2 Scope

The scope of this Wildlife Monitoring Plan includes:

- Avian and Bat Fatality Monitoring – This monitoring will help determine what avian and bat fatalities or casualties are attributable to the operating wind Project throughout the monitoring period. A sampling approach (a select group of turbines) will be used. Fatalities are defined as any find where death occurred, such as a carcass, carcass parts, bones, or feather spot (further defined below in Section 1.4.1). Also included are injured birds and bats where cause of the casualty is likely attributable to the operating wind Project.

- Raptor Nest and Sage Grouse Lek Monitoring – This monitoring initially focuses on raptor nesting outcomes and potential Project influence during the first nesting year following construction . All known nest sites within the project boundary will be checked for status. It also includes sage grouse lek monitoring within and around the project area for five years after construction.

- Avian Use and Displacement Surveys – This monitoring will take place at previously surveyed plots within the project boundary, The purpose of observing and recording avian use on these plots is to try and determine if any displacement effects have taken place since construction. In addition, these surveys will provide a basis to evaluate, in general terms, whether the species with the highest fatality numbers are also the most common species using the site.

- Wildlife Handling and Reporting – This protocol will be used for handling and reporting wildlife fatalities (e.g., carcasses) or injured wildlife discovered incidental to monitoring studies or Project operations during the study period. After the study is complete the protocol will be adjusted to reflect standard operation procedures established by West Butte Wind.

1.3 Site Description

The Project area lies almost entirely in southwestern Crook County, Oregon, on private land with the main access road lying mainly in Deschutes County. The Project lies north of Highway 20, thirty-two miles east of Bend, and is located on the land formation known as the Bear Creek Buttes, with the vast majority of the Project located on West Butte.

The habitat is primarily shrub-steppe, with sagebrush throughout, but there is a large—and increasing—western juniper component. Ponderosa pine is sporadic on the Project area except in two places, where rather large stands can be found.

2.0 AVIAN AND BAT FATALITY MONITORING

2.1 General Information

Avian and bat fatality monitoring includes systematic post-construction fatality search's during a two year study period. Fatality monitoring for West Butte Wind Project will begin when all the turbines are constructed and operational. Year two monitoring will be conducted in the fifth year after construction. Various documents or on-going regional monitoring studies have provided background information for development of this fatality monitoring plan. The West Butte baseline wildlife study, (Gerhardt et al., 2008) and the nearby Leaning Juniper Wind Project wildlife fatality monitoring study (Gritski et al., 2008) and Klondike II monitoring plan results (NWC and WEST, 2007) have provided regional information. West Butte monitoring protocols will be somewhat similar to others used in the region including Stateline Wind Project - Umatilla County, OR and Walla Walla, WA (Erickson et al., 2004; Erickson et al., 2002; and FPL et al., 2001), Big Horn Wind Project - Klickitat County, WA (Kronner et al., 2008), Klondike II – Sherman County, OR (Northwest Wildlife Consultants, Inc. et al., 2007) and Leaning Juniper Wind Project - Gilliam County, OR (Kronner et al., 2007).

Monitoring for avian and bat fatalities consists of the following components:

- Standardized carcass searches to record number of fatalities attributable to the operating wind Project (assumed to be collisions with turbines or collisions with operations vehicles traveling roads near turbines) during the one-year monitoring period.
- Searcher efficiency trials to estimate percentage of carcasses located by searchers.
- Carcass removal trials to estimate length of time a carcass remains in the field prior to scavenger removal or possible detection. This will be used to derive the probability that a carcass has not been removed and hence is potentially detectable during the standardized search.

2.1.1 Standardized Carcass Searches

Standardized carcass searches for avian and bat casualties attributable to the operating wind Project (turbines) will be conducted at systematically surveyed selected turbines. A 180-meter square search plot centered on the turbine will be delineated at each turbine base selected for search.

The searches will be conducted at 13 (32.5%) of the Project's 40 turbines for the two year monitoring study. The turbines will be selected for searching based on position in the landscape, representative distribution, and land use within the Project area. Year two turbines will be a separate set of 13 (32.5%) selected turbines as compared to year one turbines. This will comprise 26 (65%) of the 40 turbines over a two year period for the project.

The first monitoring search will be conducted to clear the plots of evidence of old carcasses and to document fatalities that may have occurred during the testing and

early operational phase. Subsequently, a total of sixteen plot searches will be conducted at each of the selected turbines during each monitoring year. A proposed search schedule for the four season search period rotation is presented in Table 3.2-1. Due to increased attention on bat and wind turbine interactions and potential concerns during the avian and bat migration period as well as findings from regional wind projects, carcass searches will be conducted twice each month during the spring and fall migration season. The Leaning Juniper and Klondike II monitoring study data has indicated fall migration season as being the primary period when a higher percentage of bat species may have a potential to collide with turbines when compared to other seasons (Kronner et al., 2008, Northwest Wildlife Consultants et al. 2007). Results at nearby Klondike II indicate that 92% of all avian fatalities occurred in the spring and fall season. West Butte turbines will be searched once per month during winter and summer seasons (see Table 3.2-1) and twice per month during spring and fall seasons (weather and field conditions permitting).

Table 3.2-1

Season	**Frequency**
Spring Migration	2 searches per month (4 searches)
Summer/Breeding	1 search per month (3 searches)
Fall Migration	2 searches per month (5 searches)
Winter	1 search per month (4 searches)

Personnel trained in proper search techniques will walk parallel transects initially spaced at 6-8 meter intervals across the search plots searching for casualties. A searcher walks at a rate of approximately 45-60 meters a minute along each transect searching both sides out to 3-4 meters for casualties. Search area and speed may be adjusted by habitat type after evaluation of the periodic searcher efficiency trials or when field conditions necessitate narrower or wider transects.

For all casualties found, the observer will record species, sex and age when possible, date and time collected, location, condition and any comments that may indicate cause of death. For carcasses where the cause of death is not apparent, the fatality is attributed to the Project.

The condition criteria include the following categories:

- Intact – a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
- Scavenged – an entire carcass, which shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in 1 location (e.g., wings, skeletal remains, legs, pieces of skin, etc.).
- Feather Spot - 10 or more feathers or 3 or more primaries (the outermost 9-12 wing feathers) at 1 location indicating predation or scavenging.

All carcasses found will be labeled with a unique number, bagged and frozen for future reference. All casualties located will be photographed as found and mapped on a detailed map of the study area. Discovery of any threatened or endangered species will be coordinated with USFWS and ODFW.

Casualties found in non-search areas (e.g., near a turbine not included in the search area) will be recorded as an incidental discovery and will be documented in a similar fashion as those found during standard searches. Casualties found by maintenance personnel and others not conducting the formal searches will be left undisturbed, recorded using the wildlife reporting forms (Appendix A), and reported to the Project biologist. Specific protocol for handling and reporting of injured or dead birds and bats is included in Section 5.0, to comply with the permits.

Any injured native birds found by study personnel during standard searches will be carefully captured by the observer and transported to the Blue Mountain Wildlife rehabilitation center located in Pendleton, Oregon or veterinary clinic if warranted. Appropriate collection permits will be obtained from the USFWS and ODFW to comply with specific agency requirements for handling protected birds.

Dissemination of information and data pertaining to dead or injured birds to the USFWS and other agency representatives is required per the Special Purpose Permit (held by NWC, see Section 5). Disposal of carcasses and specimens will follow the protocol outlined in the Special Purpose Permit. Opportunities for contribution to science (i.e. genetic sampling) will be explored.

2.1.2 Searcher Efficiency Trials

Searcher efficiency trials are used to estimate the percentage of avian/bat fatalities that are found by searchers. The trials will be conducted in the same areas carcass searches occur. Searcher efficiency is estimated by size of carcass and season. Estimates of searcher efficiency are used to adjust the number of carcasses found, correcting for detection bias.

Searcher efficiency trials will begin during the operational phase of the Project. A total of approximately 20 detection carcasses of birds in 2 different size classes (small and large) will be placed in the search area each of the four seasons during the first study year, resulting in a total of 80 searcher efficiency trial carcasses for the year. Carcasses will be distributed evenly throughout the Project. Carcasses will be placed on the site a minimum of 2 days each season for a minimum total of 8 trial dates over the course of the 4 seasons of the study. An attempt will be made to use several small brown birds during the fall season to simulate bat carcasses, however, legally obtained bat carcasses will be used, if available.

Personnel conducting the searches will not be informed of the dates of the trials or the location of the detection carcasses. If new searchers are brought into the carcass survey, additional detection trials may be conducted to insure that detection rates incorporate searcher differences.

The time spent searching during the trial days versus non-trial days and the number and location of the detection carcasses found during the carcass search will be recorded in Project databases. The number of carcasses available for detection during each trial will be determined immediately after the trial by the person responsible for distributing the carcasses.

2.1.3 Carcass Removal Trials

Estimates of carcass removal are used to adjust carcass counts (carcasses found) for removal bias. Carcass removal includes removal by predation or scavenging, or removal by other means such as being plowed into a field. The carcasses will be placed randomly within the carcass removal trial plots. Carcass removal trial plots will be located outside the carcass search plots at non-searched turbines to avoid confusing trial carcasses with actual wind facility related fatalities. Carcasses will be randomly placed. The trial will consist of 10 carcasses of birds of 2 size classes (small and large) distributed during each of the 4 seasons during the first year, resulting in 80 carcasses for the year. Small carcasses (i.e., non-native birds such as European starlings, house sparrows, quail, juvenile ringed-necked pheasants, and small rock doves and native birds, subject to availability) will be used to simulate passerines. Adult ring-necked pheasants, large rock doves and mallards will be used to simulate large birds such as raptors, game birds and waterfowl. Native birds will be used subject to availability and State or federal permit requirements. Carcasses will be checked for a period of 35 days to determine removal rates. They will be checked every day for the first 4 days, and then on Day 7, Day 10, Day 14, Day 21, Day 28 and Day 35. At the end of the 35-day period, any remaining birds and feathers will be removed.

2.2 Data Analysis and Assessment

The number of avian and bat fatalities attributable to the Project will be determined based on the number of avian and bat fatalities found in the Project area whose death or injury appears to be related to the Project. For this monitoring, all causalities which include fatalities (e.g. carcasses, feather spots) and injured wildlife found within the search plots will be attributed to the wind project. These casualties may be discovered in 3 ways during the study: 1) by study personnel during formal standardized carcass searches, 2) incidentally by study personnel during other activities on the Project, and 3) by operations personnel or others incidentally during plant operations, maintenance, or other onsite activities. All casualties located in the search plots will be included in the data set as fatalities resulting from the operating wind Project (unless cause of death is determined to be unrelated to the Project). This assumes that each casualty would have been discovered during the formal searches. This includes non-releasable injured birds or bats and carcasses where the cause of death is not apparent.

These data will be adjusted by estimates of searcher efficiency and of the proportion of carcasses expected to persist unscavenged during each interval using the following equation: $\frac{c_{ijk}}{\hat{p}_{jk} * \hat{r}_{jk} * \hat{e}_{jk}} = \hat{f}_{ijk}$

where c_{ijk} is the observed number of carcasses in the k^{th} size class at the i^{th} turbine during the j^{th} search, $\hat{m}_{ijk}$ is the estimated fatality in the k^{th} size class that occurred at the i^{th} turbine during the j^{th} search, $\hat{p}_{jk}$ is the estimated probability that a carcass in the k^{th} size class that is on the ground during the j^{th} search will actually be seen

by the observer, $\hat{r}_{jk}$ is the probability than an individual bird or bat that died during the interval preceding the j^{th} search will not be removed by scavengers and $\hat{e}_{jk}$ is the effective interval, i.e. the ratio of the length of time before 99% of carcasses can be expected to be removed to the search interval. $\hat{p}_{jk}$ is estimated through searcher efficiency trials with estimates given above. $\hat{r}_{jk}$ is a function of the average carcass persistence rate, estimated through searcher efficiency trials, and the length of the interval preceding the j^{th} search. $\hat{r}_{jk}$, $\hat{e}_{jk}$ and $\hat{p}_{jk}$ are assumed not to differ among turbines, but differ with season (i.e. search j) and carcass size (k).

Analysis method components could change between the start and finish of this monitoring as new or improved estimators for deriving at the per turbine or per MW annual mortality rate are developed and applicable.

3.0 RAPTOR NEST AND SAGE GROUSE LEK MONITORING

3.1 Purpose

Raptor nest and sage grouse lek monitoring will be conducted to assess post-construction (operational phase) impacts of the Project on raptor nest use and lek activity within the Project area. In particular, nesting by special status species within the Project area is monitored to determine turbine operation influences on species of greatest concern to ODFW, the ferruginous hawk and golden eagle. Nest location and density will be recorded. The 2008 study year data is the baseline data for this monitoring, supplemented with any nest status data obtained while conducting construction monitoring during that year.

Sage grouse lek monitoring will also be conducted to determine if lek's still exist within or around the project area for a period of five (5) years after construction.

3.2 Methods

Nesting raptors will be assessed within the Project area in 2009. Nesting outcome such as success and number of young (if possible) will be recorded in a Project database and the data submitted in the annual report. The database is an Excel file managed by NWC.

The inspection (ground-based) will focus on documenting activity at special status species' nests that are within the Project leased land boundary area. Some observations will be obtained before this survey while the biologists are on-site to conduct other monitoring. Nests will be checked from a distance with binoculars and/or spotting scope. Species observed, the number of individuals, and the behavioral patterns will be recorded.

Sage grouse will be monitored for lekking activity during at least 3 separate surveys each year for the five year period and any grouse observed will be recorded.

4.0 AVIAN USE AND DISPLACEMENT SURVEYS

4.1 Purpose

The purpose of observing and recording avian use at the already surveyed avian points within the turbine area is to identify if any displacement occurs due to turbine operations and construction and/or additional species that have not been listed in the original baseline survey report are present. In addition, these surveys provide a basis to evaluate, in general terms, whether the species with the highest fatality numbers are also the most common species at the site. In particular, the small-plot surveys focus on smaller birds (passerines) utilizing the habitats of proposed developments during the breeding season.

These surveys involved the establishment of eight fixed-radius points (Ralph et al. 1993) in spring 2008, each of which was surveyed three times during the spring breeding season: May 10, 31 and June 12, 2008 (all 8 plots surveyed 3 times for a total of 24 surveys). Points covered each habitat type on the Project, and were also spaced across the length and width of the area. Study plots were 100-meter in radius. Plots were surveyed by an experienced avian ecologist using a ten-minute observation period, and all surveys were completed between sunrise and five hours after sunrise, consistent with standard protocols used nationwide. Surveys were not conducted when wind and weather conditions were likely to hamper the researcher's ability to detect whatever birds were present.

General data recorded included date, time, and weather variables. Data associated with bird detections included species and number, age and sex, behavior and habitat. Locations of all detections were plotted on a map of the point. Species encountered in-transit between survey points were also recorded. Products resulting from this study include a list of avian species using the Project area during the breeding season and associated analyses (including, but not limited to, diversity indices and a list of confirmed breeders).

4.2 Methods

This monitoring involves surveying the eight fixed-radius points established in the preconstruction phase (Ralph et al. 1993) in the first and third spring after construction, each of which will be surveyed three times during the spring breeding season. (all 8 plots surveyed 3 times for a total of 24 surveys). Points covered each habitat type on the Project, and were also spaced across the length and width of the area. Study plots are 100-meter in radius. Plots will be surveyed by an experienced avian ecologist using a ten-minute observation period, and all surveys will be completed between sunrise and five hours after sunrise, consistent with standard protocols used nationwide. Surveys will not be conducted when wind and weather conditions are likely to hamper the researcher's ability to detect whatever birds were present.

General data recorded will include date, time, and weather variables. Data associated with bird detections included species and number, age and sex, behavior and habitat. Locations of all detections will be plotted on a map of the point. Species encountered in-transit between survey points will also be recorded. Products resulting from this study include a list of avian species using the Project area during the breeding season and associated analyses (including, but not limited to, diversity indices, a list of confirmed breeders and a possible analysis of displacement provided the sample size is adequate.).

5.0 WILDLIFE HANDLING AND REPORTING

5.1 Purpose

This section describes protocols for handling and for reporting of dead or injured wildlife found incidentally by operations personnel during the two year fatality monitoring study period. It also includes reporting of special or unusual observations by operations personnel incidental to their operation and maintenance activities and general procedures for the life of the Project.

5.2 Handling

Operations personnel should not handle injured and dead wildlife under any circumstances. Injured or dead wildlife found by operations personnel and others not conducting the formal searches (described in Section 2.2.1) will be documented using the wildlife incidental reporting form (Appendix A).

5.2.1 Injuries

An injured animal is any bird or bat with an apparent injury, or that exhibits signs of distress to the point where it cannot move under normal means or does not display normal escape or defense behavior. Prior to assuming an animal is injured, it should be observed to determine if it cannot or does not display normal behaviors. For example, raptors will occasionally walk on the ground, especially if they have captured a prey item. Raptors also "mantle" or hold their wings out and down covering a prey item. These types of behaviors may make the wings appear broken or the bird injured.

Any injured wildlife (birds, bats) should not be handled or harassed under any circumstance. Operation personnel must contact their operations manager immediately and complete the incidental wildlife report (Appendix A). Personnel should report species, condition, behavior, and location (need to be specific and flag site if possible). Photographs are encouraged but not required. The operations manager will contact Project biologists. The Project biologist will work with a designated wildlife rehabilitator on capture, transport and rehabilitation. The USFWS will also be notified within 24 hours if any federally threatened or endangered species or eagles are discovered.

5.2.2 Fatalities

Bird and bat fatalities found in non-search areas will be treated as incidental discoveries and will be left undisturbed. Avian and bat fatalities including carcasses, carcass parts, bones, or feather spots (see Section 2.2.1) discovered by operations personnel will be recorded on a standardized incidental wildlife reporting form, photographed, and reported to their Operation Manager (Appendix A). The Manager will notify the Project biologist of discovery and forward the report. If a state or federal endangered, threatened or otherwise protected species is discovered, USFWS and ODFW will be notified by the Project biologist within 24 hours. Collection of state or federal endangered, threatened, or protected species will be coordinated by the Project biologist with USFWS and ODFW personnel.

5.3 Reporting

Reporting consists of internal notifications by operations personnel and external submittal to USFWS and/or ODFW where permit conditions require. Operations personnel will document and report all injured or dead wildlife (and livestock) discovered during the life of the Project to the Operations Manager. An intact carcass, carcass parts, bones, or scattered feathers or an injured bird or bat are all considered reportable incidences. All such discoveries are to be reported even if it is uncertain if the carcass or parts are associated with a wind project structure. The Operations Manager will work with the Project biologist and/or landowner on the appropriate level of external contact needed and for assistance with coordinating quick removal of dead livestock or deer, as these may be an attractant to large birds (raptors, ravens) near operating turbines.

External reporting includes key monitoring findings and the draft and final reports to the county. In addition to reporting to the county during the study year, an annual mortality report will be submitted to USFWS and ODFW as required under permit requirements for the life of the Project. During the study year, this report will be submitted under the Special Purpose Permit held by NWC and will meet West Butte Wind reporting obligations during the study period.

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7.0 APPENDICES

Appendix A. Wildlife Reporting Form

West Butte Wind Project
Incidental Wildlife Reporting Form

WHO found: _____

WHEN found: (date/time) _____

WHAT found: (check or circle) **DO NOT HANDLE WILDLIFE**

Fatality/Carcass/Feathers	**Injured Wildlife**
o Bird (describe):	o Bird (describe):
o Bat:	o Bat:
o Other (describe):	o Other (describe):
Remarks:	Remarks:

Comments: _____

_____

WHERE found (describe): MARK OR FLAG SITE

Turbine #/Landmark: _____

Direction/Distance: _____

Remarks: _____

HOW notify: CONTACT SUPERVISOR IMMEDIATELY, REPORTING REQUIRED

Northwest Wildlife Consultants, Inc. West Butte Wind

<site contact to be added>

The USFWS will also be notified (email and phone) within 24 hours if any federally threatened or endangered species or eagles are discovered

Appendix C

Biological Study Results

West Butte Wind Power Project

Biological Study Results

West Butte Wind Power Project

Prepared for:

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1.0 Introduction

This draft report identifies and describes wildlife, habitat, rare plant, and other field investigations associated with the West Butte Wind Power Project (Project) located in central Oregon (Figure 1) and the results of studies completed through October 31, 2008. Surveys were designed to assess the presence in and use of the Project area by special status wildlife and plant species as well as document use by the more common wildlife species, during specific seasons. Animal and plant scientific names for common names used in this report can be found in Section 4.2 and appendices.

A tour of the project site was provided by West Butte Wind to Oregon Department of Fish and Wildlife (ODFW), Bureau of Land Management (BLM), and Crook County on May 15, 2008. United States Fish and Wildlife Service (USFWS) was invited to attend but was unavailable. The study plan for this project was discussed and any comments on the study plan were invited. The study plan was designed and refined with collaboration of Northwest Wildlife Consultant's and agency involvement.

Methods and results of all study components are reported within this summary. These are:

- Review of existing information, database search and informal consultation with Agencies
- Rare plant surveys
- Avian use surveys (large-plot)
- Small-plot avian surveys (breeding passerines)
- Special status wildlife surveys
- Ground-based lek censuses
- Aerial raptor nest survey
- Bat species inventory

2.0 Study Area and Habitat

The Project area lies almost entirely in southwestern Crook County, Oregon, with the main access road lying mainly in Deschutes County. The Project lies north of Highway 20, thirty-two miles east of Bend, and is located on the land formation known as the Bear Creek Buttes, with the vast majority of the Project located on West Butte (Figure 1).

The habitat is primarily shrub-steppe, with sagebrush throughout, but there is a large—and increasing—western juniper component. Historically, the juniper was likely confined to the draws, with periodic wildfires preventing it from establishing on the uplands. Much of the juniper currently found on the Project area is relatively young, a fact that suggests recent encroachment facilitated by fire suppression.

Ponderosa pine is sporadic on the Project area except in two places, where rather large stands can be found. Spring-fed streams are small, and so no riparian systems exist to break up the shrub-steppe habitat. Nonetheless, topographic relief exists primarily in the form of rolling hills, and some of the draws between these hills will carry water from late winter and spring snowmelt.

3.0 Methods

3.1 Review of Existing Information and Database Search

An initial database search was conducted to ascertain the Endangered, Threatened, and special status species of wildlife and plants likely to be present in and near the Project area. The U.S. Fish and Wildlife Service maintains lists (by County) of endangered, threatened, proposed, and candidate species and species of concern, and these electronic file lists have been accessed for both Crook and Deschutes Counties (Appendices A-1 and A-2). In addition, in January 2008 a list of documented occurrences of rare, threatened, and endangered plant and wildlife species within 5 miles of the Project leased land boundary (as provided to NWC as of January 2008; Figure 1) was requested from the Oregon Natural Heritage Information Center (ORNHIC; Appendix A-3). Results were reviewed and special status vascular plant species and special status vertebrate wildlife species with potential for occurrence on the Project site are listed in Appendices B and C.

3.2 Habitat Mapping

Habitat mapping within the proposed Project area was initiated in the spring of 2008 and was completed in October 2008 (Figures 2a and 2b). Mapping was conducted utilizing a combination of aerial photograph interpretation and on-the-ground verification. The mapping effort characterizes the range of habitat types present within the Project area from the perspective of potential and existing wildlife use for both general (i.e. shrub-steppe obligates) and specific (i.e. special status species) vertebrate taxa.

Prior to field surveys, initial habitat boundaries were delineated in a digital GIS environment at a scale of 1:5,000 using 2005 1-meter resolution color orthophotographs. These broad habitats were further defined into subtypes based on field surveys conducted in the spring/summer of 2008. For each habitat type, field notes included dominant and co-dominant vegetation and overall habitat quality (vegetation structure, age, size of trees, presence or absence of invasive vegetation, history of disturbance). Experienced wildlife biologists sampled each of the habitat types during various field studies and draft habitat maps were adjusted and refined as necessary to reflect actual conditions in the field. Once final adjustments were made, amounts of acreage were calculated by habitat type for the Project area and for the areas along the access road.

3.3 Rare Plant Surveys

Target species for the purposes of this survey included all possible Federal and Oregon Department of Agriculture Candidate, Threatened and Endangered taxa considered likely to occur in the general region around the Project. In addition, rare species lacking Federal and State status but which are actively tracked by the ORNHIC were included in the target list. The target list is found as Appendix B.

Surveys covered a buffer area extending 200 feet outwards from the proposed turbine string center line and proposed roads, for a total 400-foot wide survey corridor. The entire large area in sections 31 and 32 (Figure 2a) was surveyed since specific turbine string placement had not yet been confirmed.

The survey time windows were designed to maximize the potential for accurate identification of as many taxa as possible in the field and hence to ensure adequate

coverage with respect to potential occurrences of special status taxa. Surveys were conducted June 2 through 8, 2008. Follow-up surveys for green-tinged paintbrush (*Castilleja chlorotica)* were conducted July 7-9 and 13-15, 2008, with additional surveys to delineate the extent of the population occurring sporadically through early August.

Field investigators employed hand-held Garmin® GPS devices for recording survey tracks on the ground. During the survey the investigators kept a cumulative list of all vascular taxa encountered. The primary flora resource utilized on the Project was Hitchcock and Cronquist (1973) with supplemental usage of the 5-volume Flora of the Pacific Northwest (Hitchcock et al. 1955-1969).

3.4 Avian Use Surveys (large-plot)

Five 800-meter-radius, non-overlapping avian use study plots were delineated on the Project area (Figure 3). Plot placement was designed to maximize viewing and provide excellent coverage of the proposed turbine strings as well as varying habitat and topography. Weekly avian use surveys were conducted for a one-year period. Results for designated winter, spring, summer, and fall seasons are included within this report Winter season surveys began November 21, 2007 and ended March 14, 2008. Spring season surveys began March 22 and ended May 28, 2008. Summer season surveys began June 5 and ended August 14, 2008. Fall season surveys began August 19 and ended October 31, 2008. Avian use surveys follow a variable circular-plot method (Reynolds et al. 1980) to determine species composition and relative abundance of birds using the Project and flight altitudes associated with avian use of this area. Survey protocol is similar to that used in the Columbia Basin of Oregon and Washington including the Leaning Juniper Phase I and Phase II Wind Projects (Kronner et al. 2005), Klondike I Wind Power Project (Johnson et al. 2002), and Klondike III Wind Power Project (Mabee et al. 2005). An experienced avian ecologist is positioned at the center of the plot and collects data on all wildlife seen or heard during a 20-minute observation period. This includes observations both within and outside the 800-meter radius (though several analyses may use only the within-plot data). A full set of surveys (5 plots) is generally completed on the same survey day, weather permitting, and plots are surveyed equally during different times of day (morning, mid-day, and afternoon), to the extent feasible, to reduce temporal bias. High snow level and inclement weather prevented access to some plots on several occasions in winter and spring, and a thunderstorm prevented one survey from being completed in summer.

In winter season, surveys were conducted for 15 weeks and there were 15 visits to 3 plots and 11 visits to 2 plots for a total of 67 surveys. In spring season, surveys were conducted for 11 weeks and there were 11 visits to 3 plots and 10 visits to 2 plots for a total of 53 surveys. In summer season there were 11 visits to 4 plots and 10 visits to 1 plot for a total of 54 surveys. In fall season there were 11 visits to each of the 5 plots for a total of 55 surveys. For each plot during fall, the surveyor remained at two of the plots for a full hour (that is, an additional 40 minutes). The five plots were rotated on a weekly basis so each plot was surveyed for one hour at least four times during the eleven fall season surveys. The purpose of this extension was to strengthen confidence that surveys did not miss any movement through the area by fall migrants, especially among raptors. Avian use tables (section 4.4 below) show only the data from the first 20 minutes for these surveys, but the text identifies raptors detected during the additional 40-minute portions of these fall surveys.

General data recorded includes date, time, weather, and wildlife observed. Data collected on birds detected includes species, number of individuals, habitat association, and behavior,

including flight height and direction. In addition, flight paths of raptors and other species of interest were hand-plotted in the field at the time of observation. These are then plotted on individual plot maps (topographic maps with study plot boundary delineation). Whenever special status species and species of interest (including raptors, sage-grouse, and big game) were observed while in-transit near the study plots, within the general Project area, these observations were also recorded. Data were entered into a Microsoft Access database.

3.5 Small-plot Avian Surveys

Small-plot avian surveys complement the large-plot avian use surveys described above (Section 3.4). In particular, the small-plot surveys focus on smaller birds (passerines) utilizing the habitats of proposed developments during the breeding season. These data can aid in describing overall habitat quality and value for native wildlife, to be used later during the avian impact assessment and detailed facility micrositing process.

These surveys involved the establishment of eight fixed-radius points (Ralph et al. 1993) in spring 2008, each of which was surveyed three times during the spring breeding season: May 10, 31 and June 12, 2008 (all 8 plots surveyed 3 times for a total of 24 surveys). Points covered each habitat type on the Project, and were also spaced across the length and width of the area. Study plots were 100-meter in radius. Plots were surveyed by an experienced avian ecologist using a ten-minute observation period, and all surveys were completed between sunrise and five hours after sunrise, consistent with standard protocols used nationwide. Surveys were not conducted when wind and weather conditions were likely to hamper the researcher's ability to detect whatever birds were present.

General data recorded included date, time, and weather variables. Data associated with bird detections included species and number, age and sex, behavior and habitat. Locations of all detections were plotted on a map of the point. Species encountered in-transit between survey points were also recorded. Products resulting from this study include a list of avian species using the Project area during the breeding season and associated analyses (including, but not limited to, diversity indices and a list of confirmed breeders).

3.6 Special Status Wildlife Surveys

Surveys for special status wildlife species were conducted between May 15 and June 9, 2008. The area covered was 451 acres associated with the access road and 1,785 acres associated with proposed turbine strings. This area was surveyed by walking meandering ground transects averaging 50 meters apart from one another throughout the Project area. The area covered included a 200-foot buffer around proposed turbine strings and the roads connecting them and a 200-foot buffer on either side of the proposed access road. All of sections 31 and 32 were covered (since exact placement of turbine strings had not yet been confirmed). All special status species encountered were recorded in field notebooks and with a handheld GPS unit or plotted on USGS topographical map. GIS-generated maps were prepared showing locations of individuals or clusters of breeding pairs.

3.7 Greater Sage-Grouse Lek Censuses

After discussions with ODFW and BLM it was collaboratively decided that the known lek site on the project be monitored. Ground-based censuses (Connelly et al. 2003) were conducted on three dates in spring 2008, April 4, April 18, and May 2, 2008 of the one known greater sage-grouse lek within the Project as identified by the Oregon Natural Heritage and Information Center. Surveys were aimed at determining the number of individuals

associated with this lek. Lekking occurs before and just after sunrise, and thus censuses were conducted for approximately an hour during this period. The observer approached as quietly and unobtrusively as possible, balancing a desire to obtain a good view with the need to avoid disturbing the birds. Binoculars and, where necessary, a spotting scope were used to determine the number and sex (when possible) of individuals present at the lek.

3.8 Raptor Nest Survey

The objective of the raptor nest survey was to obtain information that will help predict potential impacts of the Project to nesting raptors. Potential impacts include those that might occur during construction or operation of the Project and might involve disturbance during nesting, direct loss of nest structure, or death of nesting birds or fledglings through collision with turbines. Information gained from this study is expected to be useful for avoiding, minimizing and/or mitigating impacts and for designing post construction monitoring studies.

A single aerial survey was conducted on May 21 and 22, 2008. It was performed from a helicopter, using a qualified avian ecologist and a helicopter pilot experienced at this type of survey. This survey covered the entire Project area and a two-mile buffer around the turbine strings and access road. All potential nesting areas—trees, transmission lines, and rock formations—were searched for raptor nests, with both active and inactive nests recorded.

Locations of all raptor nests were recorded with a hand-held Global Positioning System (GPS) unit. To determine whether a nest was active or inactive, the biologist relied on clues that included behavior of adults and presence of eggs, young, or whitewash. Attempts were made to identify the species of raptor associated with each active nest. Ground-based confirmation of nests, status, and outcome were accomplished during the course of other studies.

3.9 Inventory of Bat Species

The specific objectives of the bat investigation were to:

- Detect via acoustical monitoring the various bat species using the Project area.
- Determine whether the Project area was used by two migratory species known to be directly impacted by wind turbines in the Pacific Northwest. These two species are silver-haired bat and hoary bat.

A bat habitat field review was conducted to determine which species might occur in the general vicinity of the West Butte Wind Power Project area. This process involved an initial site visit in June 2008 to determine whether components of bat habitat were present.

Field investigations, using acoustical monitoring devices for detecting and recording bat echolocation, were conducted July 30, August 29, and September 11, 2008. These dates were all within the period of the year during which bats are known to collide with turbines in the Pacific Northwest and other regions (NWCC, 2004).

The non-invasive investigation method selected was the use of acoustical surveys with hand-held bat detectors. A surveyor used an echolocation detector to sample habitats likely to be used by bats, recording and immediately downloading any calls. Pettersson detectors—with time-expansion capabilities—and laptop computers equipped with analysis

software were used for this investigation. Each of the three surveys was conducted for several hours following sunset.

Four areas were selected for conducting bat inventories determined by the previous bat habitat field review. (Table 1). The four areas were chosen because they contained one or more of the habitat components needed by bats—food, water, and/or roosting structures. A combination of such habitat components is limited within the Project area; nonetheless, water sources (cattle troughs) and the larger of the two ponderosa pine stands were expected to have some bat activity associated with them.

Recorded (and time-expanded) call files were analyzed with SonoBat™ analysis software. Calls were sorted by quality of recording. Calls without sufficient diagnostic characteristics were not analyzed further, and the remaining calls were compared with previously recorded calls from bats of known species at other sites (library files within SonoBat™ or personal NWC library). Interpretation of bat detector calls can sometimes result in error due to call overlap among some myotis species (e.g., California myotis and Yuma myotis) and among three other species (big brown, silver-haired, and hoary bats). A conservative approach—one that used only complete calls that showed a consistent minimum frequency—was taken for identifying bats to the species level.

Table 1. Bat monitoring station habitat descriptions at the West Butte Wind Power Project, 2008.

Station	Location	Habitat Description
A	Lower elevation corrals	Cattle water tank (open water) with corrals surrounded by shrub steppe with some junipers.
B	Ponderosa pine stand	Some mature ponderosa pines in a small patch of forested habitat.
C	Ridge-top cattle water tank	Beaten down shrub-steppe and bare ground around cattle water tank.
D	Meadow cattle water tank	Small, open annual grassland surrounded by junipers and shrub-steppe.

3.10 Big Game

Observations of big game (mule deer, pronghorn, etc.) and other mammals were recorded whenever observed during all types of surveys and while in-transit to survey locations. No surveys were conducted specifically for deer, elk, or pronghorn, but their presence and numbers were documented for assessing the importance of the Project habitat to these game species.

4.0 Results

4.1 Review of Existing Information and Database Search

Target lists of special status species of plants and wildlife with potential for occurrence were developed using USFWS county lists (Appendices A-1 and A-2) as well as the ORNHIC database search (Appendix A-3). These target lists also include other details about sightings or likelihood of occurrence and can be found in Appendices B and C.

A copy of the response letter received in March 2008 from ORNHIC (site data excluded) to the request for a database search for records is included in Appendix A-3. ORNHIC reported six greater sage-grouse lekking areas, one on the Project and five others within five miles of the Project. The one documented lek on the Project site was surveyed (see Section 4.7). ORNHIC also recorded nine reports of *Castilleja chlorotica* (green-tinged paintbrush). These locations were reviewed and historical locations within survey areas were checked (see section 4.3 for rare plant surveys). Through conversations with agencies, more local information on several species was gained.

4.2 Habitat Mapping

Seven land cover/habitat types were mapped within the Project area (Figure 2a) and along the access road (Figure 2b). Habitat types and acreages are presented below. One habitat type, ponderosa pine, occurs in two distinct, well-defined stands, which together comprise only a small portion of the Project area. The remainder of both the Project area and the land on either side of the access road is a mosaic of three main habitat types. Big sagebrush steppe and dwarf shrub-steppe are the habitat types that have likely persisted on this landscape for centuries, with soil type and depth determining their locations. Juniper woodlands now covering large parts of the area were a much less prominent habitat type until recent years. Though they were a component of the landscape previously, junipers were generally confined to draws and to the lower elevations along the access road; the presence there of older trees testifies to this. Most of the junipers on the landscape today, however, are much younger, and provide evidence of recent encroachment due to fire suppression.

These three habitat types are not separated by clear lines of demarcation; rather they gradually give way to one another. An area was designated juniper woodland wherever junipers constitute more than 10% of the vegetative density. Nonetheless, junipers dot the entire landscape and will continue to increase in density (except where removal measures are undertaken or natural fire occurs). Indeed, juniper removal has been an ongoing management method in recent years, and acreages that would have been labeled juniper woodlands at the beginning of the habitat mapping process are now deemed to be big sagebrush steppe (since the junipers have been cut in the interim).

The Project area is remarkable for its habitat health (the overall ecological condition) when compared to other nearby areas of similar habitat types. Despite years of cattle grazing, the habitat remains in good ecological condition (with the exception of juniper encroachment). The plant species present are those appropriate to healthy, undisturbed areas, though it is difficult to assess whether the proportions of those species have changed as a result of grazing. There is a dearth of exotic plant species, and even those native species generally associated with disturbance are confined to relatively small areas immediately adjacent to roads.

Two spring-fed streams are found within the Project area. Though providing water for wildlife, these have little or no effect on habitat type. Each is very small (less than a meter in width) and does not provide for any different plant associations. That is, no riparian trees or shrubs are found along these streams (at least at the elevation of the Project); rather, they represent small lines of water running through the big sagebrush steppe or juniper woodlands that cover the landscape.

The Project area consists of a series of buttes and the draws separating them. The topography is rather gentle; there is very little in the way of escarpments, cliffs, or talus, and none of a size that warranted mapping. The various cover/habitat types are described below.

Big Sagebrush Steppe

The primary habitat type on the Project area is big sagebrush steppe, which occurs on approximately 2,285 acres; it comprises 49% of the Project area. Along the road corridor, it exists on 182 acres and makes up 40% of the area within 200 feet of the access road. This type occurs on deeper soils. The dominant plant species is big sagebrush (*Artemisia tridentata*); at the higher elevations, this is mountain big sagebrush (ssp. *vaseyana*), whereas at the lower elevations this is basin big sagebrush (ssp. *tridentata*). Prominent grasses include Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoregneria spicata*); common forbs associated with this habitat are silvery and Pacific lupines (*Lupinus argenteus* and *L. lepidus*, respectively) and a variety of paintbrushes (*Castilleja* spp.). The mountain big sagebrush, which dominates West Butte proper, is considered quite palatable to greater sage-grouse and other herbivores, whereas the basin big sagebrush is deemed unpalatable.

Dwarf Shrub-Steppe

This habitat type does not occur on West Butte proper, but on and around the lesser buttes to the east and northeast of the Project area and on flat areas along the access road. This habitat type exists in two different soil types.

In the higher elevations, dwarf shrub-steppe is characterized by lithosols, with the result that plants are less dense and smaller than in the deeper soils. The dominant plant species is stiff sagebrush (*Artemisia rigida*). Forbs common to this habitat include bitterroot (*Lewisia rediviva*), arrowleaf balsamroot (*Balsamorhiza sagitatta*), spiny phlox (*Phlox hoodii*), and woollypod milkvetch (*Astragalus purshii*). This habitat type occurs on approximately 1,117 acres and comprises 24% of the Project area.

Where dwarf shrub-steppe occurs along the access road, it is in sandy soils. The dominant plant species is likewise stiff sagebrush, but a codominant plant is yellow rabbitbrush (*Ericameria viscidiflora*). This habitat type occurs on 100 acres and makes up 22% of the area along the access road.

Juniper Woodlands

Wherever the vegetative cover of western juniper (*Juniperus occidentalis*) exceeds 10%, the habitat was deemed to be juniper woodlands. This habitat type occurs on 1,144 acres, or 25% of the Project area and 115 acres, or 25% of the road corridor. Juniper currently occurs across the landscape, and co-dominant plants may be those associated with the big sagebrush steppe type or those associated with dwarf shrub-steppe. Juniper woodlands tend to be found more on the deeper soils, however, where removal of the juniper would return

the land to a big sagebrush steppe. On the Project area, juniper historically thrived only in the draws and on the leeward (northeast) slopes of the buttes. Along the access road, large junipers indicate that juniper woodlands have existed for a longer time at these lower elevations. Only in a few spots is juniper found so densely as to preclude much sagebrush below.

Ponderosa Woodlands

This habitat type exists in two distinct stands on the Project area. Both are on north-facing slopes in areas of deep, sandy soils. Ponderosa pine (*Pinus ponderosa*) is the dominant plant species, with some of the larger trees being nearly 200 years old. Beneath the pine canopy can be found big basin sagebrush, wax currant (*Ribes cereum*), and a variety of other shrubs, grasses, and forbs typical of deeper soils. This habitat type provides different food, cover, and nesting opportunities than those offered by the other habitat types; as a result, several avian species not otherwise detected on the Project were found in these pine stands (as described in the results of the small-plot avian surveys, 4.5, below). The ponderosa woodland habitat type occurs on approximately 64 acres, which constitutes 1.5% of the Project area.

Annual Grassland

Annual grasslands within the Project area and along the road are largely the result of past grazing disturbances. These areas show little or no signs of re-planting efforts and have been naturally re-colonized mostly by exotic annual grasses and forbs such as cheatgrass (*Bromus tectorum*) and tumble mustard (*Sisymbrium altissimum*). Ecological disruption within these exotic-dominated communities is so severe that recovery of native plant communities is not likely to occur naturally. This habitat type comprises only a small portion of the Project area (17 acres, or less than 1%) and road edges (34 acres, 7.5%). On the Project area, this habitat is associated with springs that have been diverted into cattle troughs. If wetland-specific plants were ever found at these springs or the resulting streams, the frequency of cattle use in these immediate areas has eliminated them.

Developed

Developed areas include roads, right-of-ways, and livestock holding areas. All are landscape elements expected to remain in a state of on-going disturbance for the foreseeable future. Existing developed areas comprise 5 acres, or less than 1%, of the Project area and 20 acres, or 4.5%, of the access corridor.

Pond

A single pond of less than 1/10 acre is found in the northeast portion of the Project area. Its presence does not result in any differences in the surrounding vegetation, but it is likely significant for wildlife as a rare source of year-round water. Located in the northwest corner of the northeastern-most extension of the Project area, this pond is so small as to be difficult to locate on the habitat map (Figure 2a).

4.3 Rare Plant Surveys

Rare plant surveys covered 1,785 acres in the vicinity of proposed turbines and the roads between them as well as 451 acres representing the buffers around the road that will access the Project.

Field surveys did not result in the finding of any USFWS Endangered, Threatened, Proposed or Candidate plant taxa. Researchers did, however, locate green-tinged paintbrush (*Castilleja chlorotica*), a special status plant tracked separately by the Oregon Natural Heritage Program. A specimen was collected and sent to Mark Egger, a *Castilleja* expert at the University of Washington, who positively identified it.

On West Butte proper, an extensive population containing in excess of 50,000 plants was delineated, and the perimeters of four smaller populations to the east were identified (Figure 2a). The largest population extended onto BLM lands to the south of the Project.

Green-tinged paintbrush blooms from late June to mid-August, and was not identifiable during the early (June) surveys at West Butte. By early July, its presence was obvious; in some spots it was the dominant forb. This paintbrush was found only at elevations above 5000 feet in deep soils; it did not occur in the lithosols. It was associated with mountain big sagebrush, a preferred host plant from which it obtains its nutrients (the paintbrushes are hemiparasitic). At this location, green-tinged paintbrush was found on level ground and on north- and east-facing slopes; it was largely absent from south-and west-facing slopes.

A comprehensive list of the 97 species of plants observed during rare plant surveys can be found in Appendix D.

4.4 **Avian Use Surveys** (large-plot)

This section summarizes results of winter, spring, summer, and fall season avian use surveys. Eleven species of birds were detected during winter surveys, with Townsend's solitaire being by far the most abundant wintering bird. Spring brought an influx of avian species, and 37 species were detected during avian use surveys during the spring months. Twenty-five avian species were detected during summer season surveys and 31 species were detected during fall (Table 2). A complete species list for avian surveys can be found in Appendix E.

Raptor detections were infrequent during all survey seasons. American kestrel was recorded on four occasions during the spring, four times in summer, and three times during the fall. A single golden eagle was detected during spring surveys, and prairie falcon was detected on two occasions during summer surveys and once during fall. Red-tailed hawks were recorded once during winter surveys, five times during spring surveys, four times during summer, and three times during fall. Rough-legged hawk was detected once during winter surveys and twice during spring surveys. Two turkey vultures were observed, one during fall and one during summer surveys. In addition, there were three detections of golden eagle, four turkey vultures, one Cooper's hawk, and one red-tailed hawk outside of the 800m study plot that were not included in the analysis or tables below. Extended (hour-long) surveys conducted in the fall season did not lead to an increase in raptor detections.

Two Canada geese flew over during one spring avian use survey. These represent the only waterfowl recorded during any of these studies conducted at the Project. Greater sage-grouse were observed only during winter and spring surveys, though their presence on the Project in summer and fall was documented by in-transit detections (Table 3). No corvids were detected during summer avian use surveys; Clark's nutcracker was detected only during winter and fall, and pinyon jays were observed only during fall. The detection of several passerine species was confined to spring and summer, and some were only found during spring. The common nighthawk were reasonably abundant in summer; three were observed in early fall, but none were detected during winter or spring.

Table 2. Relative abundance of species observed during avian use surveys during four seasons, 2007–2008, at West Butte Wind Power Project.

	Winter		Spring		Summer		Fall	
	# Grp.	# Ind.	# Grp.	# Ind.	# Grp.	# Ind.	# Grp.	# Ind.
Waterfowl		**2**		**0**		**0**		**0**
Canada goose	1	2	0	0	0	0	0	0
Raptors		**2**		**12**		**12**		**8**
Accipiter		*0*		*0*		*1*		*0*
Cooper's hawk	0	0	0	0	1	1	0	0
Buteos		*2*		*7*		*4*		*3*
red-tailed hawk	1	1	3	5	4	4	3	3
rough-legged hawk	1	1	2	2	0	0	0	0
Eagles		*0*		*1*		*0*		*0*
golden eagle	0	0	1	1	0	0	0	0
Falcons		*0*		*4*		*6*		*4*
American kestrel	0	0	4	4	4	4	3	3
prairie falcon	0	0	0	0	2	2	1	1
Vultures		*0*		*0*		*1*		*1*
turkey vulture	0	0	0	0	1	1	1	1
Gamebirds		**5**		**13**		**0**		**0**
California quail	0	0	6	6	0	0	0	0
chukar	0	0	1	1	0	0	0	0
mountain quail	0	0	3	3	0	0	0	0
greater sage-grouse	1	5	2	3	0	0	0	0
Goatsucker		**0**		**0**		**17**		**3**
common nighthawk	0	0	0	0	8	17	3	3
Passerines		**119**		**326**		**358**		**588**
Songbirds		*103*		*312*		*358*		*536*
American goldfinch	0	0	0	0	0	0	1	1
American robin	8	14	22	52	16	18	20	127
ash-throated flycatcher	0	0	1	1	0	0	0	0
barn swallow	0	0	1	1	0	0	0	0
black-capped chickadee	0	0	0	0	1	1	0	0
Brewer's blackbird	0	0	3	3	0	0	2	2
Brewer's sparrow	0	0	13	21	28	119	13	34
canyon wren	0	0	0	0	0	0	1	1
Cassin's finch	0	0	0	0	4	7	0	0
cedar waxwing	0	0	0	0	0	0	1	14
chipping sparrow	0	0	12	17	15	20	0	0
dark-eyed junco	3	3	13	43	1	2	6	10
European starling	0	0	1	4	0	0	0	0
gray flycatcher	0	0	17	29	26	36	2	3
green-tailed towhee	0	0	0	0	5	5	0	0
horned lark	0	0	0	0	0	0	1	1
house finch	2	16	2	7	2	2	5	54
house wren	0	0	1	1	0	0	1	1
lark sparrow	0	0	3	4	3	3	0	0
mountain bluebird	0	0	21	38	28	85	29	125
mountain chickadee	4	4	2	2	4	9	10	13
pine siskin	0	0	0	0	0	0	2	3
purple finch	0	0	1	1	0	0	0	0
red-breasted nuthatch	0	0	0	0	0	0	7	8
rock wren	0	0	2	2	7	7	0	0
sage sparrow	0	0	1	1	0	0	0	0
sage thrasher	0	0	0	0	6	7	0	0

	Winter		Spring		Summer		Fall	
	# Grp.	# Ind.	# Grp.	# Ind.	# Grp.	# Ind.	# Grp.	# Ind.
spotted towhee	0	0	0	0	1	1	0	0
Townsend's solitaire	47	66	13	16	0	0	30	103
unidentified passerine	0	0	2	5	0	0	0	0
unidentified swallow	0	0	0	0	0	0	1	3
varied thrush	0	0	0	0	0	0	1	1
vesper sparrow	0	0	17	36	19	34	3	5
violet-green swallow	0	0	2	5	0	0	0	0
western meadowlark	0	0	1	1	1	1	1	4
western tanager	0	0	0	0	1	1	0	0
white-crowned sparrow	0	0	4	16	0	0	2	2
yellow-rumped warbler	0	0	3	6	0	0	10	21
Corvids		*16*		*14*		*0*		*52*
black-billed magpie	0	0	1	2	0	0	2	8
common raven	10	11	6	12	0	0	4	7
Clark's nutcracker	2	5	0	0	0	0	8	12
pinyon jay	0	0	0	0	0	0	3	25
Hummingbird		**0**		**3**		**3**		**1**
calliope hummingbird	0	0	1	1	0	0	0	0
rufous hummingbird	0	0	0	0	2	2	0	0
unidentified hummingbird	0	0	2	2	1	1	1	1
Swift								**5**
Vaux's swift	0	0	0	0	0	0	1	5
Woodpecker		**0**		**27**		**10**		**15**
northern flicker	0	0	21	27	10	10	8	15
Totals	**80**	**128**	**211**	**381**	**201**	**400**	**185**	**620**

Winter season: 15 weeks, November 21, 2007–March 14, 2008, 5 plots, 67 total surveys.
Spring season: 11 weeks, March 22–May 28, 2008, 5 plots, 53 total surveys.
Summer season: 11 weeks, June 5–August 14, 2008, 5 plots, 54 total surveys.
Fall season: 11 weeks, August 19–October 31, 2008, 55 total 20-minute surveys

Note: for species with more than one recorded, individuals may have been counted more than once.

Raptors, shrikes and other species of interest detected while the surveyor was in-transit to and between points are reported in Table 3. Several avian species were detected in-transit that were not detected during point counts in any season including ferruginous hawk, loggerhead shrike, northern shrike, northern goshawk, and sharp-shinned hawk. Family groups (adults with young) were detected on several occasions including red-tailed hawk, Cooper's hawk, and mountain quail.

Table 3. Avian species and number of observations recorded while in-transit to avian use surveys at West Butte Wind Power Project, in four seasons, 2007-2008.

Common Name	Observed Only In-Transit	Winter Number	Spring Number	Summer Number	Fall Number
American kestrel			2	2	5
Cooper's hawk			6	18	1
ferruginous hawk	X	2	3		
golden eagle				4	
great horned owl	X				1
greater sage-grouse		3	4	13	12
loggerhead shrike	X			3	1
long-eared owl	X		1		
mountain quail				15	
northern goshawk	X	1			
northern shrike	X	1			
prairie falcon		1	2	1	
red-tailed hawk		1	9	13	2
rough-legged hawk		1			
sage sparrow			1		
sharp-shinned hawk	X		1		1
turkey vulture			1		

*Table includes raptors and other species of potential interest that were observed incidentally while traveling in-transit near survey plots. As with the plot observations, for species with more than one recorded, individuals may have been counted more than once.

Mean use, percent composition, and percent frequency of occurrence for all avian species detected during surveys are presented in Table 4. Percent composition (the percentage of the total avian detections represented by an individual species) provides a quick way of identifying the species most commonly observed on the Project in a given season. Percent frequency of occurrence is the percentage of surveys in which a species (or group) was detected. Mean use measures the number of individuals of a species (or group) per 20-minute point count. This measure is most useful for comparisons with studies at other wind energy sites, and such comparisons can be predictive if those other studies have associated with them post-construction fatality estimates. (Mean use is discussed in section 5.2 below.)

Passerines comprised between 85 and 95% of avian detections in all seasons. In winter, four species—Townsend's solitaire, house finch, American robin, and common raven—made up more than 80% of all bird detections, with Townsend's solitaire comprising 52% of the total. Two species—Brewer's sparrow and mountain bluebird—accounted for more than 50% of all summer detections, whereas mountain bluebird, American robin, and Townsend's solitaire together comprised more than 57% of fall detections. Raptors accounted for only 1.3-3.15% of all avian detections, and greater sage-grouse comprised 0-3.9% of detections.

Table 4. Number of groups and individuals, mean use, percent composition, and percent frequency of occurrence for avian groups observed within 800 meter study plots during West Butte Wind Power Project in four seasons of avian use surveys, 2007–2008.

Species	Winter (67 surveys)	Spring (53 surveys)	Summer (54 surveys)	Fall (55 surveys)
		Mean Use[1]		
Waterfowl	**0.030**	**0.000**	**0.000**	**0.000**
Canada goose	0.030	0.000	0.000	0.000
Raptors	**0.030**	**0.226**	**0.222**	**0.145**
Accipiter	*0.000*	*0.000*	*0.019*	*0.000*
Cooper's hawk	0.000	0.000	0.019	0.000
Buteos	*0.030*	*0.132*	*0.074*	*0.055*
red-tailed hawk	0.015	0.094	0.074	0.055
rough-legged hawk	0.015	0.038	0.000	0.000
Eagles	*0.000*	*0.019*	*0.000*	*0.000*
golden eagle	0.000	0.019	0.000	0.000
Falcons	*0.000*	*0.075*	*0.111*	*0.073*
American kestrel	0.000	0.075	0.074	0.055
prairie falcon	0.000	0.000	0.037	0.018
Vultures	*0.000*	*0.000*	*0.019*	*0.018*
turkey vulture	0.000	0.000	0.019	0.018
Gamebirds	**0.075**	**0.245**	**0.000**	**0.000**
California quail	0.000	0.113	0.000	0.000
chukar	0.000	0.019	0.000	0.000
mountain quail	0.000	0.057	0.000	0.000
greater sage-grouse	0.075	0.057	0.000	0.000
Goatsucker	**0.000**	**0.000**	**0.315**	**0.055**
common nighthawk	0.000	0.000	0.315	0.055
Passerines	**1.776**	**6.151**	**6.630**	**10.691**
Songbirds	*1.537*	*5.887*	*6.630*	*9.745*
American goldfinch	0.000	0.000	0.000	0.018
American robin	0.209	0.981	0.333	2.309
ash-throated flycatcher	0.000	0.019	0.000	0.000
barn swallow	0.000	0.019	0.000	0.000
black-capped chickadee	0.000	0.000	0.019	0.000
Brewer's blackbird	0.000	0.057	0.000	0.036
Brewer's sparrow	0.000	0.396	2.204	0.618
canyon wren	0.000	0.000	0.000	0.018
Cassin's finch	0.000	0.000	0.130	0.000
cedar waxwing	0.000	0.000	0.000	0.255
chipping sparrow	0.000	0.321	0.370	0.000
dark-eyed junco	0.045	0.811	0.037	0.182
European starling	0.000	0.075	0.000	0.000
gray flycatcher	0.000	0.547	0.667	0.055
green-tailed towhee	0.000	0.000	0.093	0.000
horned lark	0.000	0.000	0.000	0.018
house finch	0.239	0.132	0.037	0.982
house wren	0.000	0.019	0.000	0.018
lark sparrow	0.000	0.075	0.056	0.000
mountain bluebird	0.000	0.717	1.574	2.273
mountain chickadee	0.060	0.038	0.167	0.236
pine siskin	0.000	0.000	0.000	0.055

Species	Winter (67 surveys)	Spring (53 surveys)	Summer (54 surveys)	Fall (55 surveys)
purple finch	0.000	0.019	0.000	0.000
red-breasted nuthatch	0.000	0.000	0.000	0.145
rock wren	0.000	0.038	0.130	0.000
sage sparrow	0.000	0.019	0.000	0.000
sage thrasher	0.000	0.000	0.130	0.000
spotted towhee	0.000	0.000	0.019	0.000
Townsend's solitaire	0.985	0.302	0.000	1.873
unidentified passerine	0.000	0.094	0.000	0.000
unidentified swallow	0.000	0.000	0.000	0.055
varied thrush	0.000	0.000	0.000	0.018
vesper sparrow	0.000	0.679	0.630	0.091
violet-green swallow	0.000	0.094	0.000	0.000
western meadowlark	0.000	0.019	0.019	0.073
western tanager	0.000	0.000	0.019	0.000
white-crowned sparrow	0.000	0.302	0.000	0.036
yellow-rumped warbler	0.000	0.113	0.000	0.382
Corvids	*0.239*	*0.264*	*0.000*	*0.945*
black-billed magpie	0.000	0.038	0.000	0.145
common raven	0.164	0.226	0.000	0.218
Clark's nutcracker	0.075	0.000	0.000	0.127
pinyon jay	0.000	0.000	0.000	0.455
Hummingbird	**0.000**	**0.057**	**0.056**	**0.018**
calliope hummingbird	0.000	0.019	0.000	0.000
rufous hummingbird	0.000	0.000	0.037	0.000
unidentified hummingbird	0.000	0.038	0.019	0.018
Swift	**0.000**	**0.000**	**0.000**	**0.091**
Vaux's swift	0.000	0.000	0.000	0.091
Woodpecker	**0.000**	**0.509**	**0.185**	0.273
northern flicker	0.000	0.509	0.185	0.273
Totals	**1.910**	**7.189**	**7.407**	**11.273**

	% Composition[2]			
Waterfowl	**1.563**	**0.000**	**0.000**	**0.000**
Canada goose	1.563	0.000	0.000	0.000
Raptors	**1.563**	**3.150**	**3.000**	**1.290**
Accipiter	*0.000*	*0.000*	*0.250*	*0.000*
Cooper's hawk	0.000	0.000	0.250	0.000
Buteos	*1.563*	*1.837*	*1.000*	*0.484*
red-tailed hawk	0.781	1.312	1.000	0.484
rough-legged hawk	0.781	0.525	0.000	0.000
Eagles	0.000	*0.262*	*0.000*	*0.000*
golden eagle	0.000	0.262	0.000	0.000
Falcons	0.000	*1.050*	*1.500*	*0.645*
American kestrel	0.000	1.050	1.000	0.484
prairie falcon	0.000	0.000	0.500	0.161
Vultures	0.000	*0.000*	*0.250*	*0.161*
turkey vulture	0.000	0.000	0.250	0.161
Game birds	**3.906**	**3.412**	**0.000**	**0.000**
California quail	0.000	1.575	0.000	0.000
chukar	0.000	0.262	0.000	0.000
mountain quail	0.000	0.787	0.000	0.000
greater sage-grouse	3.906	0.787	0.000	0.000
Goatsucker	**0.000**	**0.000**	**4.250**	**0.484**

Species	Winter (67 surveys)	Spring (53 surveys)	Summer (54 surveys)	Fall (55 surveys)
common nighthawk	0.000	0.000	4.250	0.484
Passerines	**92.969**	**85.564**	**89.500**	**94.839**
Songbirds	*80.469*	*81.890*	*89.500*	*86.452*
American goldfinch	0.000	0.000	0.000	0.161
American robin	10.938	13.648	4.500	20.484
ash-throated flycatcher	0.000	0.262	0.000	0.000
barn swallow	0.000	0.262	0.000	0.000
black-capped chickadee	0.000	0.000	0.250	0.000
Brewer's blackbird	0.000	0.787	0.000	0.323
Brewer's sparrow	0.000	5.512	29.750	5.484
canyon wren	0.000	0.000	0.000	0.161
Cassin's finch	0.000	0.000	1.750	0.000
cedar waxwing	0.000	0.000	0.000	2.258
chipping sparrow	0.000	4.462	5.000	0.000
dark-eyed junco	2.344	11.286	0.500	1.613
European starling	0.000	1.050	0.000	0.000
gray flycatcher	0.000	7.612	9.000	0.484
green-tailed towhee	0.000	0.000	1.250	0.000
horned lark	0.000	0.000	0.000	0.161
house finch	12.500	1.837	0.500	8.710
house wren	0.000	0.262	0.000	0.161
lark sparrow	0.000	1.050	0.750	0.000
mountain bluebird	0.000	9.974	21.250	20.161
mountain chickadee	3.125	0.525	2.250	2.097
pine siskin	0.000	0.000	0.000	0.484
purple finch	0.000	0.262	0.000	0.000
red-breasted nuthatch	0.000	0.000	0.000	1.290
rock wren	0.000	0.525	1.750	0.000
sage sparrow	0.000	0.262	0.000	0.000
sage thrasher	0.000	0.000	1.750	0.000
spotted towhee	0.000	0.000	0.250	0.000
Townsend's solitaire	51.563	4.199	0.000	16.613
unidentified passerine	0.000	1.312	0.000	0.000
unidentified swallow	0.000	0.000	0.000	0.484
varied thrush	0.000	0.000	0.000	0.161
vesper sparrow	0.000	9.449	8.500	0.806
violet-green swallow	0.000	1.312	0.000	0.000
western meadowlark	0.000	0.262	0.250	0.645
western tanager	0.000	0.000	0.250	0.000
white-crowned sparrow	0.000	4.199	0.000	0.323
yellow-rumped warbler	0.000	1.575	0.000	3.387
Corvids	*12.500*	*3.675*	*0.000*	*8.387*
black-billed magpie	0.000	0.525	0.000	1.290
common raven	8.594	3.150	0.000	1.129
Clark's nutcracker	3.906	0.000	0.000	1.935
pinyon jay	0.000	0.000	0.000	4.032
Hummingbird	**0.000**	**0.787**	**0.750**	**0.161**
calliope hummingbird	0.000	0.262	0.000	0.000
rufous hummingbird	0.000	0.000	0.500	0.000
unidentified hummingbird	0.000	0.525	0.250	0.161
Swift	**0.000**	**0.000**	**0.000**	**0.806**
Vaux's swift	0.000	0.000	0.000	0.806
Woodpecker	**0.000**	**7.087**	**2.500**	**2.419**
northern flicker	0.000	7.087	2.500	2.419

Species	Winter (67 surveys)	Spring (53 surveys)	Summer (54 surveys)	Fall (55 surveys)
Totals	**100.000**	**100.000**	**100.000**	**100.00**
	% Frequency of Occurrence[3]			
Waterfowl	**1.493**	**0.000**	**0.000**	**0.000**
Canada goose	1.493	0.000	0.000	0.000
Raptors	**2.985**	**16.981**	**18.519**	**12.727**
Accipiter	*0.000*	*0.000*	*1.852*	*0.000*
Cooper's hawk	0.000	0.000	1.852	0.000
Buteos	*2.985*	*9.434*	*7.407*	*5.455*
red-tailed hawk	1.493	5.660	7.407	5.455
rough-legged hawk	1.493	3.774	0.000	0.000
Eagles	*0.000*	*1.887*	*0.000*	*0.000*
golden eagle	0.000	1.887	0.000	0.000
Falcons	*0.000*	*7.547*	*11.111*	*7.273*
American kestrel	0.000	7.547	7.407	5.455
prairie falcon	0.000	0.000	3.704	1.818
Vultures	*0.000*	*0.000*	*1.852*	*1.818*
turkey vulture	0.000	0.000	1.852	1.818
Game birds	**1.493**	**20.755**	**0.000**	**0.000**
California quail	0.000	11.321	0.000	0.000
chukar	0.000	1.887	0.000	0.000
mountain quail	0.000	5.660	0.000	0.000
greater sage-grouse	1.493	3.774	0.000	0.000
Goatsucker	**0.000**	**0.000**	**14.815**	**5.455**
common nighthawk	0.000	0.000	14.815	5.455
Passerines	**70.149**	**86.792**	**92.593**	**90.909**
Songbirds	*67.164*	*86.792*	*92.593*	*87.273*
American goldfinch	0.000	0.000	0.000	1.818
American robin	11.940	41.509	25.926	24.455
ash-throated flycatcher	0.000	1.887	0.000	0.000
barn swallow	0.000	1.887	0.000	0.000
black-capped chickadee	0.000	0.000	1.852	0.000
Brewer's blackbird	0.000	5.660	0.000	1.818
Brewer's sparrow	0.000	24.528	50.000	21.818
canyon wren	0.000	0.000	0.000	1.818
Cassin's finch	0.000	0.000	7.407	0.000
cedar waxwing	0.000	0.000	0.000	1.818
chipping sparrow	0.000	22.642	27.778	0.000
dark-eyed junco	4.478	24.528	1.852	7.273
European starling	0.000	1.887	0.000	0.000
gray flycatcher	0.000	32.075	48.148	3.636
green-tailed towhee	0.000	0.000	9.259	0.000
horned lark	0.000	0.000	0.000	1.818
house finch	1.493	3.774	3.704	7.273
house wren	0.000	1.887	0.000	1.818
lark sparrow	0.000	5.660	5.556	0.000
mountain bluebird	0.000	39.623	50.000	41.818
mountain chickadee	5.970	3.774	7.407	18.182
pine siskin	0.000	0.000	0.000	3.636
purple finch	0.000	1.887	0.000	0.000
red-breasted nuthatch	0.000	0.000	0.000	12.727
rock wren	0.000	3.774	12.963	0.000
sage sparrow	0.000	1.887	0.000	0.000

Species	Winter (67 surveys)	Spring (53 surveys)	Summer (54 surveys)	Fall (55 surveys)
sage thrasher	0.000	0.000	11.111	0.000
spotted towhee	0.000	0.000	1.852	0.000
Townsend's solitaire	62.687	24.528	0.000	50.909
unidentified passerine	0.000	3.774	0.000	0.000
unidentified swallow	0.000	0.000	0.000	1.818
varied thrush	0.000	0.000	0.000	1.818
vesper sparrow	0.000	32.075	35.185	5.455
violet-green swallow	0.000	3.774	0.000	0.000
western meadowlark	0.000	1.887	1.852	1.818
western tanager	0.000	0.000	1.852	0.000
white-crowned sparrow	0.000	7.547	0.000	3.636
yellow-rumped warbler	0.000	5.660	0.000	16.364
Corvids	*16.418*	*11.321*	*0.000*	*25.455*
black-billed magpie	0.000	1.887	0.000	3.636
common raven	13.433	11.321	0.000	7.273
Clark's nutcracker	2.985	0.000	0.000	15.545
pinyon jay	0.000	0.000	0.000	5.455
Hummingbird	**0.000**	**5.660**	**3.704**	**1.818**
calliope hummingbird	0.000	1.887	0.000	0.000
rufous hummingbird	0.000	0.000	3.704	0.000
unidentified hummingbird	0.000	3.774	1.852	1.818
Swift	**0.000**	**0.000**	**0.000**	**1.818**
Vaux's swift	0.000	0.000	0.000	1.818
Woodpecker	**0.000**	**39.623**	**18.519**	**14.545**
northern flicker	0.000	39.623	18.519	14.545

[1] Mean Use: mean number of individuals within 800m plot/20-minute point count for each species or group provides an index of the magnitude of avian use, but it does not describe density.

[2] Percent Composition: mean use for a species/total use across all species, multiplied by 100, providing an estimate of the relative use of any particular species, compared to the use by all other species combined.

[3] Frequency of Occurrence: percentage of surveys in which a species was observed with the survey plot providing an index of how often a species occurs in the project area.

* Seasons: Winter: Nov. 21, 2007–March 14, 2008
Spring: March 22, 2007–May 29, 2008
Summer: June 5, 2008–August 14, 2008
Fall: August 19-October 31, 2008

4.5 Small-plot Avian Surveys

Thirty-eight species were detected during small-plot avian surveys in May and June 2008. Nearly all of these are presumed to have been breeding on the Project. (Townsend's solitaire is likely the lone exception; the one individual detected was probably late in departing from the winter range.) Results for each point are presented in Table 5 and study plots are shown on Figure 3. Seven avian species were detected during the small-plot surveys that were not detected during the large-plot avian use surveys (Appendix E). These species were black-headed grosbeak, brown-headed cowbird, hairy woodpecker, Hammond's flycatcher, mourning dove, ruby-crowned kinglet, and western wood-pewee.

Table 5. Avian species detected at each plot during small-plot avian surveys 2007–2008, West Butte Wind Power Project.

Species	Study Plot								
	A	B	C	D	E	F	G	H	Total
American goldfinch				2					**2**
American kestrel								1	**1**
American robin	5		6	5		2	2		**20**
black-headed grosbeak				1					**1**
Brewer's blackbird		2	4						**6**
Brewer's sparrow	1	10	1		13	2	3	3	**33**
brown-headed cowbird				2					**2**
California quail		1							**1**
Cassin's finch		2	2						**4**
chipping sparrow	7	4	2	7	1	2	2		**25**
Clark's nutcracker				1					**1**
Cooper's hawk			1						**1**
dark-eyed junco	3	2	7	6					**18**
gray flycatcher	3	6	2	3	1	2	2	2	**21**
green-tailed towhee		1				3			**4**
hairy woodpecker			1						**1**
Hammond's flycatcher				2					**2**
house finch		1	2	1					**4**
house wren		1	4						**5**
lark sparrow	1			2					**3**
mountain bluebird		1	3	1		2	2	4	**13**
mountain chickadee		1	2						**3**
mourning dove	1		1						**2**
mountain quail						1			**1**
northern flicker	1	1							**2**
red-breasted nuthatch		1	2	1					**4**
rock wren						2	1	1	**4**
ruby-crowned kinglet	1								**1**
greater sage-grouse							1		**1**
sage thrasher							1		**1**
song sparrow			2						**2**
spotted towhee						1			**1**
Townsend's solitaire								1	**1**
vesper sparrow	3			6	8	2	4	1	**24**
western tanager			3	1					**4**
western wood-pewee	1		1						**2**
winter wren	2			1		1			**4**
yellow-rumped warbler	1		4	3					**8**
Total	**30**	**34**	**50**	**45**	**23**	**20**	**18**	**13**	**233**

Small plot surveys conducted on May 10, May 31, and June 12, 2008 at all 8 plots (total 24 surveys).

4.6 Special Status Wildlife Species Surveys

Special status wildlife species surveys resulted in detection of four special status avian species and one reptile; these were greater sage-grouse, loggerhead shrike (and nests), mountain quail, sage sparrow, and sagebrush lizard. All detections of State listed species are mapped on Figures 2a and 2b. A comprehensive list of all bird, mammal, reptile, and amphibian species detected during the special status wildlife species ground transect surveys, including non-status wildlife is found as Appendix F. The two nests of raptor species (Cooper's hawk and American kestrel) found during ground transect surveys are discussed in the raptor nest Section 4.8 and shown on Figure 4. For a summary of all sightings of special status wildlife observed on all types of surveys, see Appendix C.

Greater Sage-Grouse (State Sensitive-Vulnerable, Federal Species of Concern) were encountered as individuals and small groups. One nest was documented based on behavior of the adult. Fecal material of this species wherever encountered was also documented as a means of delineating areas of use. Use of the Project area by greater sage-grouse includes lekking behavior and nesting, and grouse can be found in the Project area throughout all seasons of the year. Based on detections of fecal matter, it appears that grouse use is highest on West Butte itself, with the smaller buttes to the east and northeast receiving only infrequent use.

Loggerhead Shrike (State Sensitive-Vulnerable, USFWS Bird of Conservation Concern) individuals were found while surveying the buffer around the access road, and two active nests were located. This species is quite common in this general area, and breeding is expected in the juniper and sage habitat at the elevations through which the access road runs.

Mountain Quail (State Sensitive-Undetermined, Federal Species of Concern) are not uncommon on and around the Project area, and their breeding here is established by the observation of adults accompanied by very young chicks. This species was encountered in a variety of locations in the mid- to higher elevations of the access road and the areas proposed for turbine string placement.

Sage Sparrow (State Candidate, USFWS Bird of Conservation Concern) was detected once during the special status wildlife species surveys (at low elevation along the access road). once in-transit between avian use counts, and once during a small-plot avian count. The dearth of detections of this species could be explained by their secretive nature or by their being transient individuals (rather than breeding residents). The local breeding status of sage sparrow remains undetermined.

Sagebrush Lizard (State Sensitive-Vulnerable, Federal Species of Concern) was encountered in sandy areas of the Project and along the access road. This reptile was generally associated with sandy areas containing sage, and was usually found on south-facing slopes.

4.7 Greater Sage-Grouse Lek Censuses

Three censuses of one lek were undertaken at first light on April 2, 18 and May 2, 2008. Results are displayed in Table 6. The lek itself is a slightly-sloping area largely devoid of vegetation and surrounding a large cattle water trough.

Table 6. Summary of greater sage-grouse lek censuses, West Butte Wind Power Project.

Date	# Females	# Males	# Unknown Sex	Total
04/04/2008	0	1	2	3
04/18/2008	1	3	0	4
05/02/2008	1	3	0	4

4.8 Raptor Nest Survey

Aerial raptor nest surveys were conducted on May 21 and 22, 2008. These covered an area of 48,500 acres (75.78 mi^2).

Fourteen nests of five species of raptors were documented within two miles of the Project and access road (Table 7; Figure 4). Many nests found during the aerial survey were inactive when encountered, including both assumed (by composition and/or location) golden eagle nests and all six of the nests deemed to have been built by ferruginous hawks. Inactive nests may be used by various species of raptors in future years. Five nests were active when found, including three red-tailed hawk, one American kestrel, and one Cooper's hawk nest. These include two nests (Cooper's hawk and American kestrel) found during special status wildlife species ground transect surveys.

The two inactive nests assumed built by golden eagles were both in large ponderosa pines. A single golden eagle was seen in the vicinity of one of the nests. It may be that a nesting attempt occurred this year at that nest but had failed by the time of the survey flight. It is perhaps equally likely that there are alternate nests—within this eagle's home range but outside of the area covered by the aerial survey—one of which was used for nesting this year.

A pair of ferruginous hawks was observed near the cluster of six inactive nests assumed built by this species in junipers. While it is possible that surveyors missed an active nest, it seems as though this pair of hawks experienced an early failure of this year's nest attempt. The pair of ferruginous hawks was frequently encountered in this area early in the breeding season, but eventually disappeared before successful fledging of young would have been expected to occur.

Three active red-tailed hawk nests were documented. Two were in ponderosa pines somewhat north of the proposed turbine strings, and one was in a juniper tree within two miles of the access road. The latter nest attempt has since failed, whereas fledging occurred at one of the pine nests. (The other pine nest is relatively inaccessible, and so monitoring of its outcome did not take place.) Two inactive nests were also found that were determined to be built by red-tailed hawk (one in a juniper tree and one in ponderosa pine).

The Cooper's hawk nest in a juniper tree near Daly Spring had three 2-week-old chicks on July 14, 2008. Young American kestrels successfully fledged from their nest in a juniper cavity (near where the access road meets the proposed turbine strings). American kestrel pairs were more frequently encountered at lower elevations along the access road; there are likely other cavity nests of this species in the large junipers at that elevation.

Neither the Project area nor the area within two miles of it contain large rimrock or cliffs suitable for nesting by golden eagles or prairie falcons. Smaller rock outcrops may, however, provide holes that could be used for nesting by American kestrels and barn owls.

Table 7. Nests located during the 2008 aerial raptor nest survey, and ground-based surveys of the West Butte Wind Power Project.

Species	# Nests found during aerial survey	# Nests found during ground transect surveys
American kestrel	0	1
Cooper's hawk	0	1
red-tailed hawk	3	0
inactive *Buteo* nest (assumed built by ferruginous hawk)	6	0
inactive *Buteo* nest (assumed built by red-tailed hawk)	2	0
inactive assumed golden eagle nest	2	0

4.9 Inventory of Bat Species

During each of the three nights of bat inventory, temperatures were relatively warm (10-15 degrees C) during the sample period, and insect presence (particularly moth activity) was evident. Wind speeds varied from less than 5 to greater than 10 kph.

Approximately 87 echolocation calls were recorded during this study. Of these, 45 were useful for a relatively positive identification. This method does not allow one to distinguish number of individuals of a given species; ten calls of one species may be made by ten different individuals (on the one extreme) or may represent ten calls by the same individual (on the other). What can be determined from the data is species composition at the different sites. Five different bat species were positively identified, and five others were tentatively identified during surveys. Only the clearest of calls were used, and doubtful calls were not used for analysis.

Survey #1: July 30, 2008

On the first night of inventory, three species were positively identified: little brown bat (*Myotis lucifugus*), small-footed myotis *(M. ciliolabrum*), and long-eared myotis (*M. evotis*). Calls of individual bats of from one to five other species—whose call frequencies and patterns overlap considerably—were also detected. One or more—or all—of these species might have been present: hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), and/or big brown bat (*Eptesicus fuscus*), which share a call frequency overlap, and California myotis (*M. californicus*) and/or *Yuma myotis* (*M. yumanensis*) which share another call frequency overlap.

Survey #2: August 29, 2008

Five species of bat were positively identified on the second night of bat inventory. These were little brown bat, small-footed myotis, long-eared myotis, pallid bat (*Anttrozous Pallidus*), and Townsend's big-eared bat (*Corynorhinus townsendii*). Other calls indicated the

presence of one, two, or all of the following species as well: hoary bat, silver-haired bat, and big brown bat.

Survey #3: September 11, 2008

Four bat species were positively identified on the third night of surveys. They were little brown bat, small-footed myotis, long-eared myotis, and Townsend's big-eared bat. Also detected were the calls of California myotis and/or Yuma myotis.

Table 8 summarizes bat species by survey station. As discussed above, some species were not positively distinguished from others with similar calls; these included big brown bat, hoary bat, and silver-haired bat which all have call frequency overlap as well as California myotis, and Yuma myotis which have call frequency overlap. Full descriptions of survey stations can be found in Table 1 in section 3.9.

Table 8. Bat species detected by survey station at West Butte Wind Power Project, July-September, 2008.

Species (CODE) *Scientific Name* Common Name	Station A *Lower elevation corrals*	Station B *Ponderosa pine*	Station C *Ridge-top cattle water tank*	Station D *Cattle water tank-meadow*
(MYEV) *Myotis evotis* Long-Eared Myotis	X	X	X	X
(MYCA) or (MYYU) *Myotis californicus/yumanensis* California Myotis/Yuma myotis	X	-	-	X
(MYLU) *Myotis lucifugus* Little Brown Bat	X	-	X	X
(MYCI) *Myotis ciliolabrum* Small-Footed Myotis	X	-	-	X
(ANPA) *Anttrozous Pallidus* Pallid Bat	-	-	-	X
(LANO) *Lasionycteris noctivagans* Silver-Haired Bat or LACI or EPFU	X	-	-	X
(LACI) *Lasiurus cinereus* Hoary Bat or LANO or EPFU	X	-	-	X
(EPFU) *Eptesicus fuscus* Big Brown Bat or LANO or LACI	X	-	-	X
(COTO) *Corynorhinus townsendii* Townsend's Big-Eared Bat	-	X	-	X

4.10 Big Game

During avian use surveys or in-transit to surveys, there were a total of 59 detections of mule deer, primarily during the winter months. Sightings were all of multiple individuals and group size ranged from 2 to 14 individuals. Pronghorns were observed during late winter and early spring (with one sighting of a male in July). There were a total of 99 detections of pronghorn, and group size ranged from 1 to 35 with several sightings of large groups (totaling 14, 17, 20, and 35 individuals). Pronghorn were detected in the lower elevations along the access road, especially near a seasonal pond (shown in Figure 2b). Elk were not encountered; droppings and a single shed antler were documented, but these were quite old.

5.0 Discussion

5.1 Rare Plants

The only special-status plant species encountered, green-tinged paintbrush, has always been considered rare. Endemic to Oregon, it is confined to high-elevation (above 5,000 ft) locations in four counties, Klamath, Lake, Deschutes, and Crook (www.oregonflora.org). The Project is very near the northeastern edge of the known range of this species, though it can be found farther north in western portions of Deschutes County.

Fire that kills mature sagebrush (upon which this paintbrush is hemiparasitic) can lead to at least short-term loss of green-tinged paintbrush (Wooley 1993). This effect was noted on the Project site, where the western extent of the *Castilleja chlorotica* population coincided with the eastern edge of a wildfire of 2006.

Some research has suggested that this species is avoided by cattle (Wooley and Phillips 1994), but this is contrary to what was observed at West Butte. Though its viscous character is believed to be in part a defense mechanism against grazing (and though normal precipitation in winter and spring of 2008 led to high viscidity of this plant later that year), green-tinged paintbrush was extensively eaten as soon as cattle were introduced. Indeed, after cattle were moved to a pasture, the *Castilleja chlorotica* that had a week earlier covered the ground were suddenly difficult to find, limited to the center of sagebrush plants where the cattle could not reach them. A few weeks later, there were no fruiting plants to be discovered except on adjacent lands that had not been grazed. Given that the cattle grazing regime in 2008 was not significantly different than in other years, it is unclear whether such grazing might actually promote dispersal of seeds.

The locally extensive distribution of green-tinged paintbrush on West Butte is such that micrositing of roads and turbines in order to avoid this plant is unfeasible. Thus, for the main portion of the proposed Project, construction of roads and turbine platforms would result in the permanent destruction of some plants and their habitat. Nonetheless, an extensive and dense population of *Castilleja chlorotica* is expected to remain outside the Project's footprint.

Because of its hemiparasitic nature, *Castilleja chlorotica* is considered difficult to transplant; success depends upon procuring large amounts of soil and of the plants upon which it is dependent. Therefore, post-construction re-vegetation (as along roads) should focus on maintaining native plants (especially mountain big sagebrush) and eliminating exotics. Whereas some attempts to seed *Castilleja chlorotica* in these areas is suggested, transplanting is not considered feasible.

5.2 Birds

Small-Plot Avian Study

The small-plot avian point count surveys identified 38 bird species present on the Project during the breeding season (though one, Townsend's solitaire, was likely not nesting). The results presented no surprises, though the ponderosa pine stands associated with two of the plots yielded several species not detected during other surveys. Whereas the majority of breeding birds at West Butte Wind Power Project are species generally associated with shrub-steppe habitats, the area provides a small amount of habitat for species associated with coniferous forests.

With regard to small, locally-breeding birds, there are three potential concerns associated with wind power projects. These are direct impacts (collisions), habitat loss, and displacement. The most common species breeding at West Butte appears to be Brewer's sparrow. Though this species is a federal Bird of Concern, it has no special status in Oregon, was extremely abundant throughout the Project, and remains very near the ground most all the time. Another common breeder, vesper sparrow, nests on the ground and is rarely observed far from the ground. Among the other most common species at West Butte, mountain bluebirds and American robins are observed flying at the height at which modern wind turbine rotors move, but studies at other Northwest projects have rarely documented these species as fatalities (Table 9).

It is expected that repeating these small-plot avian point counts after construction of the proposed Project will provide some information about displacement of breeding birds by roads and turbines. Thus, repeating these surveys will be suggested as part of the wildlife monitoring plan.

Species composition of small bird fatalities at regional wind projects will probably not follow similar patterns at West Butte wind project. Most of this is because horned larks make up the highest percentage (>31%) of fatalities at other regional projects that have been monitored (Table 9). Horned lark mean use was very low on this project and species with higher mean use will probably have higher fatalities with the exception of mountain bluebirds. Mountain bluebirds had high mean use and were documented nesting near the turbines at the Big Horn project in Bickleton, WA. (the self proclaimed bluebird capital of Washington). However, only one bluebird was found as a fatality during a one year fatality search of all turbines in the project. Risk to other species will probably be spread across all species equally with the exception of the high mean use species of American robin and Townsend's solitaire.

Table 9. Number and species composition of bird fatalities found at ten Columbia Basin Ecoregion wind projects where fatality monitoring studies* have been completed or are in progress.

Species	% Composition	Number of Fatalities
horned lark	31.1	205
golden-crowned kinglet	6.5	43
ring-necked pheasant (n)	5.5	36
gray partridge (n)	5.3	35
American kestrel	3.5	23
chukar (n)	3.5	23
unidentified passerine	3.3	22

Species	% Composition	Number of Fatalities
western meadowlark	3.2	21
European starling (n)	2.7	18
dark-eyed junco	2.4	16
white-crowned sparrow	2.3	15
mourning dove	2.1	14
red-tailed hawk	2.1	14
rock dove (n)	1.5	10
yellow-rumped warbler	1.5	10
ruby-crowned kinglet	1.4	9
unidentified bird	1.4	9
short-eared owl	1.2	8
winter wren	1.2	8
black-billed magpie	0.8	5
Brewer's sparrow	0.8	5
house wren	0.8	5
northern flicker	0.8	5
Swainson's hawk	0.8	5
Townsend's warbler	0.8	5
unidentified kinglet	0.8	5
American robin	0.6	4
Canada goose	0.6	4
common nighthawk	0.6	4
ferruginous hawk	0.6	4
red-breasted nuthatch	0.6	4
unidentified sparrow	0.6	4
song sparrow	0.5	3
Cassin's vireo	0.3	2
great blue heron	0.3	2
house finch	0.3	2
MacGillivray's warbler	0.3	2
mallard	0.3	2
savannah sparrow	0.3	2
spotted towhee	0.3	2
vesper sparrow	0.3	2
white-throated swift	0.3	2
American coot	0.2	1
American goldfinch	0.2	1
American pipit	0.2	1
barn owl	0.2	1
black-throated sparrow	0.2	1
bufflehead	0.2	1
Cooper's hawk	0.2	1
common raven	0.2	1
downy woodpecker	0.2	1
grasshopper sparrow	0.2	1
gray catbird	0.2	1
great-horned owl	0.2	1
hairy woodpecker	0.2	1
killdeer	0.2	1
Lewis's woodpecker	0.2	1
long-eared owl	0.2	1
mountain bluebird	0.2	1
northern harrier	0.2	1
orange-crowned warbler	0.2	1

Species	% Composition	Number of Fatalities
red-winged blackbird	0.2	1
rough-legged hawk	0.2	1
sage sparrow	0.2	1
sage thrasher	0.2	1
Swainson's thrush	0.2	1
Townsend's solitaire	0.2	1
unidentified accipiter	0.2	1
unidentified flycatcher	0.2	1
unidentified thrush	0.2	1
varied thrush	0.2	1
Vaux's swift	0.2	1
Virginia rail	0.2	1
warbling vireo	0.2	1
western grebe	0.2	1
western kingbird	0.2	1
western tanager	0.2	1
Williamson's sapsucker	0.2	1
yellow warbler	0.2	1
Total (74 species identified, 7 unidentified) (69 native identified, 5 non-native)	**100.0**	**659**

*with similar study protocols

Data from the following formal monitoring studies during the monitoring periods stated below. (Includes most, but not all incidentals found during formal monitoring studies, and one incidental found after monitoring was complete. For full reference, see reference Section 7.0: These are observed fatalities and not final estimates of fatalities, which are higher.

Erickson et al., 2008. Wild Horse Wind Facility Construction Avian and Bat Monitoring First Annual Report, January–December, 2007.

Erickson et al. 2007. Stateline Wind Project Wildlife Monitoring Annual Report, January – December 2006.

Erickson et al. 2004. Stateline Wind Project Wildlife Monitoring Final Report, July 2001 – December 2003.

Erickson et al. 2003. Nine Canyon Wind Power Project Avian and Bat Monitoring Report, September 2002–August 2003.

Erickson et al. 2000. Avian and bat mortality associated with the Vansycle Wind Plant, Umatilla County Oregon. 1999 study year.

Iberdrola Renewables. 2008. Personal communication regarding Swainson's hawk fatality at Klondike III.

Johnson, et al. 2003b. Avian and bat mortality at the Klondike, Oregon Phase I Wind Plant, Sherman County, Oregon. February 2002 – February 2003.

Kronner et al., 2008. Big Horn Wind Power Project Wildlife Monitoring Study, 2006 – 2007.

Kronner et al. 2007. Leaning Juniper Phase I Wind Power Project, 2006 – 2007. Wildlife Monitoring Annual Report.

NWC and WEST 2007. Avian and Bat Monitoring Report for the Klondike II Wind Power Project, Sherman County, Oregon. August 2005 – August 2006.

Young et al. 2007. Puget Sound Energy, Hopkins Ridge Wind Project Phase 1 Post-Construction Avian and Bat Monitoring First Annual Report. January – December 2006.

Young et al. 2006. Eurus Combine Hills Turbine Ranch Phase 1 Post Construction Wildlife Monitoring First Annual Report February 2004 – February 2005.

Includes most, but not all incidentals found during formal monitoring studies, and one incidental found after monitoring was complete. Does not include White Creek monitoring (study is incomplete)

n = non-native species

Raptor Use

Avian use metrics such as mean use and frequency of occurrence provide insight on the relative abundance of birds of concern and their risk of colliding with proposed wind turbines. For raptors, such metrics and subsequent (post-construction) fatality estimates are available for a number of regional wind-generation facilities. At eight newer projects in the regional area however, the mean raptor fatality estimate was 0.07/MW/yr (Table 9)

Table 10. Annual fatality estimates on a per turbine and per MW nameplate basis for all birds and for all raptors in the Columbia Basin Ecoregion where fatality monitoring studies have been completed.

Columbia Basin Ecoregion Wind Project [1]	All Bird Fatality Rates		Raptor Fatality Rates [2]	
Listed in order of highest to lowest All Bird Fatality Rate per MW/Year	# / MW	# / Turbine	# / MW	# / Turbine
Klondike II, OR	3.1	4.7	0.11	0.17
Stateline I and II, WA/OR	2.9	1.9	0.09	0.06
Nine Canyon I[3], WA	2.8	3.6	0.05	0.07
Combine Hills, OR	2.6	2.3	0.00	0.00
Big Horn, WA	2.5	3.8	0.15	0.23
Wild Horse[4], WA	1.6	2.8	0.09	0.17
Hopkins Ridge, WA	1.2	2.2	0.14	0.25
Vansycle, OR	1.0	0.6	0.00	0.00
Klondike I, OR	0.9	1.4	0.00	0.00
Mean	**2.07**	**2.59**	**0.07**	**0.11**

[1] Projects are sorted by cumulative bird per MW rates. References for projects: Stateline I and II-partial (Erickson et al., 2004); Vansycle (Erickson et al., 2000); Klondike I (Johnson et al., 2003c); Klondike II (NWC and West, 2007); Combine Hills (Young et al., 2006); Nine Canyon (Erickson et al., 2003a); Hopkins Ridge (Young et al., 2007); Big Horn (Kronner et al., 2008); Wild Horse (Erickson et al., 2008). Only projects with similar study methods included.

[2] Raptor estimates include diurnal raptors and owls.

[3] Nine Canyon II monitored only part-year.

[4] Wild Horse estimates include only data for the first year of a 2-year study.

Mean use at the West Butte Wind Power Project for all raptor species combined ranged from 0.03/20-min survey in the winter to 0.23/20-min survey in spring. The mean use in fall (0.145/survey) was considerably lower than either spring or summer; this low mean use figure is indicative of the fact that the Project area does not function as a raptor migration route (with concentrated, funnelled flight movements of numerous individuals), as it lacks the sort of topography that leads to concentrations of southbound birds of prey. Extending the survey period (to one hour during each of 20 surveys) during fall resulted in the detection of only a single additional raptor (an American kestrel).

This range (0.03–0.23/20-min.) of mean raptor use at West Butte Wind Power Project is considerably lower than raptor use at many other wind projects in the region, including Rattlesnake Road Wind Power Facility, Oregon (0.43-0.81/30-min; Kronner et al. 2007a), White Creek Wind I (0.38–0.56/20 min.; Kronner et al. 2005),where avian fatality monitoring is either on-going or near start up and Klondike Wind Project, Oregon (0.49–

0.73; Johnson et al. 2002), Leaning Juniper, Oregon (0.24–1.07/20 min; Kronner et al. 2005), Big Horn Wind Project, Washington (0.40–1.5/20 min; Johnson and Erickson 2004; Kronner et al. 2006a and 2006b) where avian fatality monitoring has been completed. Predicted annual fatality of raptors per MW once the Project is operational would likewise be expected to be lower compared to that observed at other regional wind energy sites.

Raptor Nests

There were 4 active raptor nests found in 2008 within two miles of the Project area and access road, excluding American kestrels (for the purposes of comparison with other projects, and because nests of this species are difficult to confirm using aerial surveys). Raptor nest density in the surveyed area (75.8 mi^2) was thus 0.05/mi^2. Nest density is likely to vary from year to year, but the number of inactive nests found can help predict maximum density. In the case of West Butte, a high nesting year would likely include one active golden eagle nest (since two inactive nests were found north and west of the Project boundary) and one active ferruginous hawk nest (since a cluster of inactive nests was found east of the access road) in addition to three active red-tailed hawk nests.

The 2008 raptor nest density at the West Butte Project (0.05 mi^2) was lower than at many other wind projects in the Pacific Northwest. Examples include Leaning Juniper Phase I Wind Project in Gilliam County, Oregon (0.41/mi^2; Kronner et al. 2005), Rattlesnake Road, Oregon (0.45/mi^2 Kronner et al. 2007), Big Horn Wind Project in Klickitat County, Washington (0.11/mi^2; Johnson and Erickson 2004), and Stateline Wind Project on the Oregon/Washington border (0.21/mi^2; Erickson et al. 2004).

Given the relatively low density of raptor nests combined with the low mean raptor use of the Project area, estimates of raptor fatality at West Butte Wind Power Project are expected to be low compared to other projects in the region. Any such fatalities are likely to consist primarily of red-tailed hawks and/or American kestrels; these species had the highest mean use of the area, and are the species that comprise a large percentage of raptor fatalities at wind projects in the U.S.

5.3 Greater Sage-Grouse

Observations

Greater sage-grouse were documented on West Butte proper (sections 31 and 32) during winter and spring avian use surveys, and during special status wildlife species surveys conducted in June. They were also observed while in-transit to avian use surveys during the summer and fall survey seasons. A single nest was documented during special status wildlife surveys, and three males were found at the lek site during two of three lek censuses. The largest groups encountered consisted of 11 birds (in-transit to survey station on August 25, 2008) and eight birds (in-transit to survey station on July 8, 2008). Pellets of this species were recorded on the smaller buttes to the east and northeast, but many more were found on West Butte itself. This corroborates the direct observations, all of which were on the top or sides of West Butte proper.

Habitat

West Butte provides suitable habitat for lekking, nesting, roosting, and foraging, in short, for all facets of the life history of this species. In part, the species' use of the Project area is due to the excellent ecological condition of the shrub-steppe habitat, particularly relative to

some of the surrounding lands. A critical component of this good habitat, however, is the subspecies of sagebrush that flourishes at this higher elevation; mountain big sagebrush is much more palatable to sage-grouse (as well as to deer and elk) than its conspecific of lower elevations (basin big sagebrush). Moreover, the mature condition of most of the sagebrush on West Butte provides good cover for nesting.

The Project area is, however, devoid of natural open areas such as those generally chosen for lekking. But the lack of this typically naturally-occurring feature has been compensated for by the cattle grazing regime of the past several years. The occupied lek is located around a large watering trough, where heavy use by cattle in summer and early fall has led to a ring of bare ground ideal for their booming and courtship displays. The cattle are not moved to this area until after the spring lekking season. There are large amounts of mature sagebrush in every direction from this lek.

The greatest threats to persistence of the Project area as suitable sage-grouse habitat are wildfires and juniper encroachment. The latter is, by and large, the result of efforts to suppress the former. And whereas the shrub-steppe habitat is likely to return to good grouse habitat shortly after fire, dense and large juniper stands are considered to reduce the likelihood of use by this species. For this reason, efforts to reduce juniper amounts is deemed beneficial to sage-grouse and suggested as an important component of mitigation and habitat enhancement.

Other Information and Long Term Suitable Habitat Availability

To date, there are no known studies that address the question of whether wind energy projects will directly or indirectly impact sage-grouse. Some studies have been conducted on greater prairie-chicken (*Tympanuchus cupido*) and lesser prairie-chicken (*T. pallidicinctus*) at wind-generation facilities, but with mixed results. In one such paper it was predicted that nesting and brood-rearing hens of both species may avoid large wind turbines (Robel et al., 2004), whereas another study documented persistence in both the number of occupied booming grounds and the number of cocks attending them near wind turbines in Minnesota and Nebraska (Toepfer and Vodehnal 2008). The conclusion of the latter study was that prairie grouse adjusted to the presence of wind generator complexes as long as suitable habitat remained.

To the extent that suitable habitat is the critical issue, development projects that are designed to minimize and mitigate impacts could potentially be among the better land use/habitat altering development options within the geographical range of the sage-grouse compared to other revenue-generating development options that are considered attractive to private ranch landowners. These other development options may result in a much greater loss of habitat and disturbance, in the near term or long term, than the comparatively smaller footprint of a wind energy project. Moreover, projects such as the one proposed for West Butte generally involve effective access restrictions that typically would minimize human disturbance of sensitive wildlife.

Cattle management initiated and implemented by the current landowner has resulted in the persistence of excellent sage-grouse habitat on West Butte. Assuming the appropriate grazing management practices will continue during the life of the operating wind project, and the recommended mitigation measures are implemented and successful (Section 6), ranching and wind energy harvesting could be expected to enhance, preserve and increase the amount of that suitable habitat.

5.4 Bats

Different bat species face quite different risks of colliding with operating wind turbines. While some of this variance may be associated with factors such as agility, it is increasingly apparent that it is flight height tendencies that make some species more vulnerable than others. Of the five species positively identified on the West Butte Wind Power Project, three—small-footed myotis, long-eared myotis, and little brown myotis—generally fly relatively close to the ground (below the rotor-swept area). Of the three, only the little brown bat has been encountered as fatalities under wind turbines, and that only infrequently (Kunz et al. 2007). Two tentatively-identified species, California myotis and Yuma myotis, are also low-flying bats not documented as fatalities at wind projects. Two other species positively identified on the Project (pallid bat and Townsend's big-eared bat) fly somewhat higher, but neither have been documented as fatalities in regional studies. These species may have been largely absent from areas where post-construction fatality monitoring has been conducted. Two high-flying migratory species, hoary bat and silver-haired bat, which make up over 90% of fatalities at most western wind energy facilities, were among the species possibly recorded at this Project. One of these, the hoary bat, has no special federal or state status. Special status bat species positively or possibly identified at the Project are discussed below.

Small-footed myotis (State Sensitive-Undetermined, Federal Species of Concern) tend to fly lower than the rotor-swept area of modern wind turbines, and are considered at low risk of collision. This species was positively identified as present at the survey points in the lower elevation corrals and the higher elevation meadow water tank.

Long-eared myotis (State Sensitive-Undetermined, Federal Species of Concern) are likewise low-foraging bats that have not been encountered with any frequency as fatalities at wind energy facilities. This species was positively detected at all of the survey stations.

Yuma myotis (Federal Species of Concern) was potentially identified during bat inventories at West Butte Wind Power Project. This species generally flies below the level of rotors, and is not frequently encountered as fatalities at wind energy facilities. There are, however, no pre-construction data demonstrating presence of this species at Pacific Northwest wind energy projects where post-construction monitoring has subsequently occurred.

Pallid bat (State Sensitive-Vulnerable, Federal Species of Concern) was positively identified near the meadow cattle watering trough. This species generally forages near the ground, but may fly higher when dispersing and migrating. Its risk of collision with rotors is unknown, since no data on its presence at wind energy sites exists. It is not, however, a species documented as a fatality at wind farms.

Townsend's big-eared bat (State Sensitive-Critical, Federal Species of Concern) was positively identified at two survey points, the meadow watering trough and the stand of ponderosa trees survey point. This species has not been encountered as a fatality at wind energy facilities currently operating in the region, but most of those facilities lack suitable habitat.

Silver-haired bat (State Sensitive-Undetermined, Federal Species of Concern) was tentatively identified as using the higher elevation meadow water tank and the lower elevation corral water tank. This is a high-flying, migratory species that is known to collide with turbine rotors. Silver-haired bats account for at least 30% of bat fatalities at those wind energy projects in the Columbia Plateau where post-construction fatality monitoring has been conducted (Kunz et al. 2007).

Of bat species without special Federal or State status, four were identified during these surveys (one positively and three tentatively). One of these, California myotis, is not documented as a fatality at operational wind facilities in the regional area. Two other species, big brown bat and little brown bat, have been found as fatalities, but only in small numbers (Erickson et al. 2004; Erickson et al. 2008; NWC and WEST 2007; Erickson et al. 2000; Kronner et al. 2008). Risk of collision to these two species at other regional wind projects has been minimal (less than 5% of the total bats found) and they are among the more widespread and common bats. Hoary bats tend to fly at the level of the rotor-swept area, and are frequently encountered as fatalities at wind-generation projects, especially during the fall when they migrate (Kunz et al. 2007). Call frequencies in the hoary bat range were detected and this bat is thought to have occurred at the site. Indeed, fatalities of bats in general show a strong peak during fall at wind energy sites in the Pacific Northwest (Erickson et al. 2004; NWC and WEST 2007; Kronner et al. 2008), suggesting that during migration bats are most vulnerable to collision with wind turbines.

Regional and local natural history information for various bat species is limited, and predicting bat collision rates from pre-construction inventories (as is done with increasing confidence for avian species) remains a speculative undertaking. Nonetheless, it is hoped that such inventories as the one conducted at the West Butte Wind Power Project will contribute to furthering our understanding of this under-studied group and the impacts to bats from wind energy generation. Post-construction inventories, together with a comprehensive fatality monitoring study, are expected to further knowledge about the risks that such projects pose to bats of different species and different life histories (e.g., residents versus migrants).

5.5 Big Game

No site-specific surveys were conducted for big game, since wind power generation has generally been deemed to be compatible with deer, elk, and pronghorn. The Project area is, however, considered winter range for big game, and presence of deer and pronghorn was confirmed during the studies reported herein.

Pronghorn were detected in the lower elevations along the access road in late winter and early spring, especially near a seasonal pond (shown in Figure 2b). Although mule deer were occasionally seen during all seasons, their presence on the Project area was most obvious during winter and early spring. Elk were not encountered at all during the year in which surveys were conducted, and droppings and a single shed antler that were encountered were all quite old. Though it has not likely always been the case, there does not currently seem to be much use of the Project area by elk.

Some disturbance of normal behavior of deer and pronghorn is to be expected during the construction phase of this Project because of the influx of humans and heavy construction equipment and associated disturbance. Following completion of the wind project, the disturbance levels from construction equipment and humans will diminish and the primary disturbances will be associated with operations and maintenance personnel, occasional vehicular traffic, and the presence of turbines and other facilities. Disturbance to deer and pronghorn associated with maintenance once the Project is operational would be expected to be low. Even this small disturbance is likely to be offset by a more effective closure of surrounding public roads, a measure expected to be enacted in association with construction of such a project. At the Big Horn Wind Project in Washington, very young, live mule deer fawns (only a few days to a week old) were observed on eight occasions in May and June

during post-construction wildlife fatality monitoring conducted on turbine search plots indicating that mule deer birthing activities occurred near turbines (NWC, 2007). At the Foote Creek Rim Wind Project in Wyoming, pronghorn antelope use within 800 meters of the site did not change significantly after construction (Johnson et al., 2000).

The Project's footprint (turbine platforms and the roads between) is likely to involve a loss of some high-quality forage for deer. Such loss is expected to be quite small, however, relative to the amount of this same habitat that will remain. Habitat mitigation aimed at greater sage-grouse (section 6.3 below) should accomplish similar goals with regard to deer.

6.0 Mitigation and Monitoring Implemented and Proposed

The following measures have been implemented, or are proposed to avoid and minimize or mitigate for anticipated impacts.

Planning Phase Avoidance and Minimization of Impacts

- Habitat mapping and extensive pre-construction biological surveys were conducted on-site to document rare plant populations, seasonal pools, unique habitats, and wildlife use. Wildlife surveys were conducted by experienced biologists during all seasons to understand how both sensitive and common wildlife species use the Project site.
- Choice of turbines with low RPM and use of tubular towers to minimize risk of bird collision with turbine blades and towers.
- Choice of underground (vs. overhead) electrical lines near turbine strings, where physically and economically feasible to minimize perching locations and electrocution hazards to birds.
- Choice of turbine lights that are accepted by the wind power industry, and accepted by the FAA for safety, as being least impacting to night migrating birds.
- Spacing of all overhead power line conductors to minimize potential for raptor electrocution.
- Use of anti-perching devices on overhead transmission line poles and other utility poles and near turbines. Distance to be determined on a site-by-site basis.

Construction Phase Avoidance and Minimization of Impacts and Monitoring

- Restrict construction on West Butte proper (area of lek) to after July 1 of year of construction of the project.
- Restrict maintenance vehicles and general access onto West Butte proper until after 11:00 am during lekking season, each year.
- Establishment and enforcement of reasonable driving speed limits during construction to minimize potential for striking wildlife.

- Flagging of any sensitive habitat areas (e.g. raptor nests, wetlands, etc.) near proposed areas of construction activity and designation of such areas as "off limits" to all construction personnel.

- Minimizing of construction in sensitive areas such as documented rare plant populations, seasonal pools and wetlands. These sites will be delineated within construction zones, where necessary.

- Training - Prior to issuance of the building permit and groundbreaking, training will be provided to construction staff explaining restrictions that protect wildlife, habitat, and critical area features in or near the construction zones.

- Enforce designated construction zones. Construction personnel will avoid driving over or otherwise disturbing areas outside the designated construction areas.

- Designation of an environmental monitor during construction to train construction personnel on avoidance of sensitive areas and to monitor construction activities to ensure compliance with mitigation measures/Permit Conditions.

- Sensitive raptor nest trees will be flagged. The environmental monitor will work with the construction contractor to minimize construction work in these areas to the extent feasible during periods when the nests are active

- Development and implementation of a fire control plan, *in coor*dination with local fire districts, to minimize risk of accidental fire during construction and operations, and respond effectively to any fire that does occur.

Post-Construction (Operations Phase) Measures and Mitigation

- Development of a revegetation and weed control plan. All temporarily disturbed areas will be reseeded with an appropriate mix of native plant species as soon as possible after construction is completed to accelerate the revegetation of these areas and to prevent spread of noxious weeds. The Applicant will consult with Oregon Department of Agriculture and the Local Weed Master regarding the appropriate seed mixes for the Project area.

- Restrict maintenance vehicles and general access onto West Butte proper until after 11:00 am during leking season, each year.

- Establish a Juniper Tree Management Program for the Project area, using ODF&W's guidelines found in their "Greater Sage Grouse Conservation Assessment and Strategies" document (Hagen, 2005). Work with ODF&W on Program specifics which may include reseeding of certain areas.

- Provide continuing access for ODF&W to the Singhose/West Butte Ranch to monitor wildlife activity and project programs.

- Identification and removal of all carcasses of livestock, big game, etc. from within the Project site or off site but near turbines that may attract foraging eagles or other raptors.

- Environmental sensitivity training will be given to all personnel on site whether employees of the operating company or its contractors. Training will include a response system if injured wildlife are discovered or if bird and bat carcasses are discovered.

Post-Construction Wildlife Monitoring and Mitigation

- Reporting of bird and bat fatalities and injured birds and bats discovered on-site for the life of the Project in a timely manner (monthly) to ODFW and USFWS.

- An avian and bat monitoring plan will be prepared. The goal will be to monitor for avian/bat fatalities in a portion of the Project for a two year time period. A different portion will be sampled each year (50% each year for two years). Consideration will be given to conducting an intensive, focused bat fatality search during late summer/fall bat migration period. The operational monitoring protocol will be designed for the Project by the wildlife consultant with input from the ODFW.

- Raptor nests within the project area will be monitored for use and productivity to determine potential indirect impacts to raptors. The objectives behind raptor nest surveys are to estimate the size of the local breeding populations of raptor species in the vicinity of the Project and to determine whether a reduction or increase of nesting activity or nesting success in the local populations of raptor species exists. Raptor nests will be monitored during the first and fourth years after construction. 2008 baseline data will be used as “pre-construction” use data.

- One or more repetitions of the small-plot avian surveys that were constructed pre-construction.

- Sage Grouse Lek Monitoring Study will be implemented for the first five years of the project. On an annual basis the known lek area and entire project area and adjacent surrounding areas will be monitored to record annual activity at the lek or any other lek that may be located within or directly adjacent to the project area. If no Lek activity is detected on the project area or adjacent properties for two consecutive years after construction, West Butte Wind will provide $50,000 annually to monitor Sage Grouse movements and leks in the Prineville District of ODF&W.

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Northwest Wildlife Consultants, Inc., Pendleton, Oregon

Karen Kronner – Senior Wildlife Biologist

Jerry Igo – Botanist

Cathy Flick – Biologist

Stewart Fletcher – Wildlife Technician

John Luginbuhl - Botanist

Brett Anderson – GIS Specialist

Miko Ruhlen- Report Editor

Barbara Wells – Assistant Report Preparer

Others

Cliff Hoeft – Helicopter Pilot, raptor nest surveys

Appendix A-1. United States Fish and Wildlife Service list for Crook County, Oregon.

FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES AND SPECIES OF CONCERN WHICH MAY OCCUR WITHIN CROOK COUNTY, OREGON

Last Updated January 5, 2008 U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Office

LISTED SPECIES

Fish

Inland: Bull trout *Salvelinus confluentus*

Anadromous: Middle Columbia River steelhead *Oncorhynchus mykiss ssp.*

PROPOSED SPECIES

None: No Proposed Endangered Species No Proposed Threatened Species

CANDIDATE SPECIES

Columbia spotted frog *Rana luteiventris*

SPECIES OF CONCERN

Mammals

Pallid bat *Antrozous pallidus pacificus*
Pygmy rabbit *Brachylagus idahoensis*
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*
Spotted bat *Euderma maculatum*
California wolverine *Gulo gulo luteus*
Silver-haired bat *Lasionycteris noctivagans*
Small-footed myotis bat *Myotis ciliolabrum*
Long-eared myotis bat *Myotis evotis*
Long-legged myotis bat *Myotis volans*
Yuma myotis bat *Myotis yumanensis*
Preble's shrew *Sorex preblei*

Birds

Northern goshawk *Accipiter gentilis*
Western burrowing owl *Athene cunicularia hypugaea*
Ferruginous hawk *Buteo regalis*
Greater sage-grouse *Centrocercus urophasianus*
Black tern *Chlidonias niger*
Olive-sided flycatcher *Contopus cooperi*
Willow flycatcher *Empidonax traillii adastus*
Yellow-breasted chat *Icteria virens*
Lewis' woodpecker *Melanerpes lewis*
Mountain quail *Oreortyx pictus*
White-headed woodpecker *PIcoides albolarvatus*
Columbian sharptailed grouse *Tympanuchus phasianellus columbianus*
Reptiles and Amphibians
Northern sagebrush lizard *Sceloporus graciosus graciosus*

Fish

Pacific lamprey *Lampetra tridentata*

Invertebrates *Insects:* Cascades apatanian caddisfly *Apatania tavala*

Plants

Henderson ricegrass *Achnatherum hendersonii*
Wallowa ricegrass *Achnatherum wallowaensis*
Henderson's bentgrass *Agrostis hendersonii*
Estes' artemisia *Artemisia ludoviciana ssp. estesii*
Bastard kentrophyta *Astragalus tegetarioides*
Crenulate grape fern *Botrychium crenulatum*
Mountain grape fern *Botrychium montanum*
Peck's mariposa lily *Calochortus longebarbatus var. peckii*
Cusick's buckwheat *Eriogonum cusickii*
Ochoco lomatium *Lomatium ochocense*
disappearing monkeyflower *Mimulus evanescens*
Howell's thelypody *Thelypodium howellii ssp. howellii*

Appendix A-2. United States Fish and Wildlife Service list for Deschutes County, Oregon.

FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES AND SPECIES OF CONCERN WHICH MAY OCCUR WITHIN DESCHUTES COUNTY, OREGON

Last Updated January 5, 2008 U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Office

LISTED SPECIES

Birds

Northern spotted owl *Strix occidentalis caurina*

Fish

Inland: Bull trout *Salvelinus confluentus*

PROPOSED SPECIES

None: No Proposed Endangered Species No Proposed Threatened Species

CANDIDATE SPECIES

Birds

Yellow-billed cuckoo *Coccyzus americanus*

Reptiles and Amphibians

Inland: Oregon spotted frog *Rana pretiosa*

SPECIES OF CONCERN

Mammals

Pygmy rabbit *Brachylagus idahoensis*
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*
Spotted bat *Euderma maculatum*
California wolverine *Gulo gulo luteus*
Silver-haired bat *Lasionycteris noctivagans*
Small-footed myotis bat *Myotis ciliolabrum*
Long-eared myotis bat *Myotis evotis*
Long-legged myotis bat *Myotis volans*
Yuma myotis bat *Myotis yumanensis*
Desert bighorn sheep *Ovis canadensis nelsoni*
Preble's shrew *Sorex preblei*

Birds

Northern goshawk *Accipiter gentilis*
Western burrowing owl *Athene cunicularia hypugaea*
Ferruginous hawk *Buteo regalis*
Greater sage-grouse *Centrocercus urophasianus*
Black tern *Chlidonias niger*
Olive-sided flycatcher *Contopus cooperi*
Willow flycatcher *Empidonax traillii adastus*
Yellow-breasted chat *Icteria virens*
Lewis' woodpecker *Melanerpes lewis*
Mountain quail *Oreortyx pictus*
White-headed woodpecker *PIcoides albolarvatus*
Columbian sharptailed grouse *Tympanuchus phasianellus columbianus*

Reptiles and Amphibians

Coastal tailed frog *Ascaphus truei*
Oregon slender salamander *Batrachoseps wrighti*
Cascades frog *Rana cascadae*
Northern sagebrush lizard *Sceloporus graciosus graciosus*

Invertebrates

Clams: California floater mussel *Anodonta californiensis*

Plants

Estes' artemisia *Artemisia ludoviciana ssp. estesii*
Cliff paintbrush *Castilleja rupicola*
Cusick's buckwheat *Eriogonum cusickii*
Peck's penstemon *Penstemon peckii*
Howell's thelypody *Thelypodium howellii ssp. howellii*

Appendix A-3. Oregon Natural Heritage Information Center response letter.

OREGON NATURAL HERITAGE INFORMATION CENTER

OSU Oregon State University
Institute for Natural Resources
1322 SE Morrison Street
Portland, Oregon 97214-2423
503.731.3070
http://oregonstate.edu/ornhic

February 29, 2008

Tamiko Ruhlen
Northwest Wildlife Consultants, Inc.
815 NW 4th Street
Pendleton, OR 97801

Dear Ms. Ruhlen:

Thank you for requesting information from the Oregon Natural Heritage Information Center (ORNHIC). We have conducted a data system search for rare, threatened and endangered plant and animal records for your West Butte Wind Power Project in Townships 17-20 South, Ranges 15-17 East, W.M.

Fifteen (15) records were noted within the provided project boundary and are included on the enclosed computer printout. A key to the fields is also included.

Please remember that the lack of rare element information from a given area does not mean that there are no significant elements there, only that there is no information known to us from the site. To assure that there are no important elements present, you should inventory the site, at the appropriate season.

This data is confidential and for the specific purposes of your project and is **not to be distributed**.

If you need additional information or have any questions, please do not hesitate to contact me.

Sincerely,

Cliff Alton
Conservation Information Assistant

encl.: invoice (H-022908-CWA1)
computer printout and data key

Appendix B. Rare Vascular Plant Species with Potential for Occurrence in the West Butte Wind Power Project Area

NAME	STATUS	TYPICAL HABITAT	LIKELIHOOD OF OCCURRENCE	IDENTIFICATION PERIOD
Achnatherum hendersonii **Henderson's ricegrass**	USFWS: SOC OR Rank: G3/S2 ODA: C ORNHIC: 1	Dry, rocky, shallow soil in sagebrush and Ponderosa pine	Low	May - June
Astragalus misellus var. misellus **Pauper milk-vetch**	OR Rank: G4T3T4/SNR ORNHIC: 3	Sagebrush plains	Moderate	April - June
Astragalus peckii **Peck's milkvetch**	OR Rank: G3/S3 ODA: LT ORNHIC: 1	Very dry sites, on loose, sandy soil or pumice, often along dry water courses and in western Juniper woodlands with *Purshia tridentata*, *Artemisia tridentata*, *Chrysothamnus viscidiflorus, Stipa occidentalis, Festuca idahoensis, Mimulus nanus* and *Penstemon humilus*	Low	Mid-May - Early August
Astragalus tegetarioides **bastard milkvetch**	USFWS: SOC ODA: C OR Rank: G3/S3 ORNHIC: 1	Dry sandy soil, in Ponderosa pine forests from 4,790 to 5,300 ft. Associated with *Artemisia tridentata*, *A. arbuscula*, *Elymus elymoides*, *Epilobium brachycarpum*, *Eriophyllum lanatum*, *Juniperus occidentalis* and *Pinus ponderosa*	Low - Moderate	Late May - Late August
Calochortus longebarbatus var. peckii **Peck's mariposa lily**	USFWS: SOC OR Rank: G4T3/S3 ODA: C ORNHIC: 1	Mesic native-dominated grasslands, often with *Pinus ponderosa*	Low	Late June - Early August
Carex bebbii **Bebb's sedge**	OR Rank: G4/S4 ORNHIC: 4	Wet meadows and stream banks	Low	May - August
Carex hystericina **porcupine sedge**	OR Rank: G5/S3 ORNHIC: 4	Stream sides in canyons and mid-slope seeps, especially in shade	Low	May - June

NAME	STATUS	TYPICAL HABITAT	LIKELIHOOD OF OCCURRENCE	IDENTIFICATION PERIOD
Castilleja chlorotica **Green-tinged paintbrush**	USFWS: SOC OR Rank: G3/S3 ORNHIC: 1	Moderate slope, dry hillsides with late-seral sbrubs in western juniper, big sagebrush and Idaho fescue plant associations. (documented on adjacent BLM land)	High	June - July
Elmera racemosa var. racemosa **yellow coralbells**	OR Rank: G4G5T4/S4 ORNHIC: 4	Rock crevices and rocky ridges and slopes, mid- to high elevations in the mountains	Low	June - August
Epilobium luteum **yellow willow herb**	OR Rank: G5/S3 ORNHIC: 4	Stream banks and wet areas at mid- to high elevations in the mountains	Low	July - September
Erigeron cascadensis **Cascade daisy**	OR Rank: G4/S4 ORNHIC: 4	Rocky places at mid to high elevations	Low	June - July
Eriogonum cusickii **Cusick's eriogonum**	USFWS: SOC OR Rank: G2/S2 ODA: C ORNHIC: 1	Rocky sagebrush deserts, often on rock outcrops	Low	June - July
Gilia sinistra *(Navarretia sinistra)* **Alva Day's gilia**	OR Rank: G4G5T4T5 ORNHIC: 4	Open chaparral or forest, serpentine or red volcanic soils, from 1,000–7,200 ft (documented location within 10 miles)	Moderate	June - July
Hierocloe odorata **holy grass**	OR Rank: G5/SNR ORNHIC: 3	May be found on moist slopes, meadows, and stream banks from the foothills to sub-alpine elevations	Low	April - July
Lomatium ochocense **Ochoco lomatium**	USFWS: SOC OR Rank: S1 ORNHIC: 1	Dry, rocky, shallow soils	Low - Moderate	April - June
Mimulus evanescens **disappearing monkeyflower**	USFWS: SOC OR Rank: G2/S2 ODA: C ORNHIC: 1	Moist gravelly, rocky areas, and low, wet fields, in sagebrush-juniper zones	Low	Late May- Late June
Nama densum var. parviflorum **leafy fiddleleaf**	OR Rank: G5T5/SNR ORNHIC: 3	Dry sandy places in deserts and foothills	Moderate	May - July

NAME	STATUS	TYPICAL HABITAT	LIKELIHOOD OF OCCURRENCE	IDENTIFICATION PERIOD
Navarretia leucocephala ssp. leucocephala **white-flowered navarretia**	OR Rank: G4T4?/S2 ORNHIC: 2	Dry meadows along the margins of volcanic ash vernal pools and in open wet ground in forest openings	Low	May - June
Pediocactus nigrispinus **snowball cactus**	OR Rank: G4/S4 ORNHIC: 4	Thin, rocky soil on ridge tops, desert valleys, and low mountains from 1000 to 4000 ft	Low	Year Round
Penstemon deustus var. variabilis **hot-rock penstemon**	OR Rank: G5T1T2 ORNHIC: 3	Dry, thin rocky soils in foothills and lowlands	Low	June - July
Penstemon seorsus **short-lobed beardtongue**	OR Rank: G4?/SNR ORNHIC: 4	Dry, rocky places often on ridge tops in the plains and foothills, often with sagebrush	Low - Moderate	Late May - June
Pilularia americana **American pillwort**	OR Rank: G5/S2 ORNHIC: 2	In WA, found in the middle zones of vernal pools from 1,930 to 2,310 ft	Low	May to Late June

USFWS (United States Fish and Wildlife Service) Ranking Key:
LE = Listed Endangered. Taxa in danger of Extinction throughout all or a significant portion of their range.
LT = Listed Threatened. Taxa likely to be classified as Endangered within the foreseeable future throughout all or a significant portion of their range.
PE = Proposed Endangered. Taxa proposed to be listed as Endangered (formal rulemaking in progress).
PT = Proposed Threatened. Taxa proposed to be listed as Threatened (formal rulemaking in progress).
C = Candidate Species. Taxa for which sufficient threats exist to warrant a proposal to list the species/subtaxon as threatened or endangered
SOC = Species of Concern. Taxa for which available information supports tracking the status and threats to the species/subtaxon.

OR Rank (Oregon Natural Heritage Program) Ranking Key:
G = Global rank indicator; denotes rank based on range wide status.
T = Trinomial rank indicator; denotes range wide status of infraspecific taxa.
S = State rank indicator; denotes rank based on status within Oregon.
1 = Critically imperiled because of extreme rarity or because some factor of its biology makes it especially vulnerable to extinction (typically 5 or fewer occurrences).
2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (typically 6 to 20 occurrences).
3 = Rare or uncommon but not imperiled (typically 21 to100 occurrences).
4 = Not rare and apparently secure, but with cause for long-term concern (usually more than 100 occurrences).
5 = Demonstrably widespread, abundant, and secure.
? = Not yet ranked.

ORNHIC (Oregon Natural Heritage Information Center) Rare Plant Lists Key:
1 = List 1 taxa are endangered or threatened throughout their range or are presumed extinct.
2 = List 2 taxa are threatened, endangered, or possibly extirpated from Oregon, but are more stable elsewhere.
3 = List 3 contains taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.
4 = List 4 contains taxa of concern which are not currently threatened or endangered

Appendix C. Special status wildlife species of known or potential occurrence in the West Butte Wind Power Project area.

Common Name and Scientific Name	Federal Status	ODFW Status	Occurrence Within or Near the West Butte Wind Power Facility D=Documented On-site N=Not Documented On-site
Mammals			
pygmy rabbit *Brachylagus idahoensis*	SoC	SV	**N-**Unlikely due to lack of suitable big sage habitat, which is generally associated with deep, loose soils.
Preble's shrew *Sorex perblei*	SoC	-	**N-**Occupies a variety of habitats, but Project area is at or beyond the western edge of species' range.
California wolverine *Gulo gulo luteus*	SoC	T	**N**-Habitat is open forests at high elevation and in alpine areas. May travel through lower elevations due to wide home ranges. Avoids young, regenerating forests and dense brushy areas.
pallid bat *Antrozous pallidus pacificus*	SoC	SV	**D**-Roosts in rock crevices, tree hollows, mines, caves, buildings and forages in rocky deserts, grasslands; takes large insects, often from the ground.
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*	SoC	SC	**D**-Habitat is typically coniferous forests, desert scrub and pinyon-juniper, sometimes found in arid grasslands. In the western United States, it uses caves, old mines, and buildings as summer day and night roosts. Does not roost in crevices (Verts and Carraway 1998) but hangs from structures. Uncommon anywhere.
spotted bat *Euderma maculatum*	SoC	-	**N**-Associated with arid desert terrain. Roosts include crevices in steep cliff faces. Known hunting grounds include open ponderosa pine forests, meadows, riparian areas, hay fields, and marshes adjacent to lakes.
silver-haired bat *Lasionycteris noctivagansyotis*	SoC	SU	**D**-Forest and grassland habitats. Regarded as a "tree" bat. Individuals have been found under the bark of trees, deeply furrowed bark, crevices in tree trunks, abandoned woodpecker holes, and bird nests. It can easily adapt to parks, cities, and farmland.
small-footed myotis *Myotis ciliolabrum*	SoC	SU	**D**-Xeric habitats near cliffs and rock outcrops. In summer it roosts in cavities in cliffs, boulders, vertical banks, the ground and talus slopes, and under rocks. Small caves, abandoned mine adits and buildings serve as night roosts. One mixed colony of males and pregnant females was discovered under wallpaper of an abandoned house.
long-eared myotis *Myotis evotis*	SoC	SU	**D**-Wide range of habitat from arid grasslands and ponderosa pine forests to humid coastal and montane forests. It uses buildings or under the bark of trees as day roosts. Maternity colonies usually are located in buildings. Caves and mine adits are used as temporary night roosts.
long-legged myotis *Myotis volans*	SoC	SU	N-Roosts in groups in buildings, rock crevices and trees. They night roost in mines and caves. Associated with montane coniferous forests but also occur in some desert and riparian habitats.

Common Name and Scientific Name	Federal Status	ODFW Status	Occurrence Within or Near the West Butte Wind Power Facility D=Documented On-site N=Not Documented On-site
Yuma myotis *Myotis yumanensis*	SoC	-	**D**-Inhabits coastal forests, ponderosa pine - Douglas-fir forests and arid grasslands. Summer day roosts are usually in buildings and other man-made structures in close proximity to water. Roost locations include rock crevices, attic under shingles and boards, caves and trees (colonies in these situations are usually small).
Birds			
greater sage-grouse *Centrocercus urophasianus*	SoC	SV	**D**-Observed during avian use study and special status wildlife species surveys. One nest documented during ground transect surveys. One Lek identified within the Project area, active in spring of 2008.
mountain quail *Oreortyx pictus*	SoC	SU	**D**-Observed in various parts of Project area on avian use and small plot avian surveys. Observed with very young chicks during special status wildlife surveys confirming that this species breeds on-site.
bald eagle *Haliaeetus leucocephalus*	NW EPA	T	**N**-May occasionally occur during winter months. Known to hunt uplands for carrion and small mammals. Nearest known nest is more than 8 miles away from the Project.
golden eagle *Aquila chrysaetos*	EPA BoCC	-	**D**- One individual and 2 inactive nests (in ponderosa pines) found during aerial nest survey and one observed in spring during avian use surveys. Also observed in-transit to survey plots.
ferruginous hawk *Buteo regalis*	SoC BoCC	SC	**D**-Observed at lower elevations within two miles of access road in-transit to avian use surveys. Five inactive nests identified (all in same general area east of access road) and a pair observed near the nests during the raptor nest survey.
northern goshawk *Accipiter gentilis*	SoC	SC	**D**-Observed in-transit to avian use survey (1 recorded in winter).
western burrowing owl *Athene cunicularia*	SoC BoCC	SC	**N**-In shrub-steppe and grassland areas, uses existing burrows of coyotes, small mammals and badgers for nesting.
loggerhead shrike *Lanius ludovicianus*	BoCC	SV	**D**-Two nests documented on either side of access road during spring special status wildlife surveys, and in-transit to summer avian use surveys. Found near proposed turbines only in early winter.
sage sparrow *Amphispiza belli*	BoCC	SC	**D**–One observed in spring during avian use surveys and one observed in-transit to avian use surveys, Also one observed during special status wildlife species surveys. State Candidate only in the Columbia Basin Ecoregion.
Brewer's sparrow *Spizella breweri*	BoCC	-	**D-**Numerous detections in summer as well as spring observations during avian use surveys.
Lewis's woodpecker *Melanerpes lewis*	SoC BoCC	SC	**N**-Ponderosa pine habitat quite limited; this species not observed during surveys.
white-headed woodpecker *Picoides albolarvatus*	SoC BoCC	SC	**N**- Ponderosa pine habitat quite limited; this species not observed during surveys.
olive-sided flycatcher *Contopus cooperi*	SoC	SV	**N**- Ponderosa pine habitat quite limited; this species not observed during surveys.

Common Name and Scientific Name	Federal Status	ODFW Status	Occurrence Within or Near the West Butte Wind Power Facility D=Documented On-site N=Not Documented On-site
willow flycatcher *Empidonax trailii adastus*	SoC	SU	**N**-No suitable riparian habitat exists within Project area.
black tern *Chlidonias niger*	SoC	-	**N**-No habitat found on Project area.
yellow-breasted chat *Icteria virens*	SoC	SC	**N**-Not found; no suitable riparian habitat exists within Project area.
Reptiles and Amphibians			
northern sagebrush lizard *Sceloparus graciosus graciosus*	SoC	SV	**D**-Found associated with sandy soils in various parts of the Project area during special status wildlife surveys.
Columbia spotted frog *Rana luteiventris*	C	SU	**N**-Not within planned facilities due to a lack of water habitat.
Fish			
steelhead (middle Columbia River ESU, summer run) *Oncorhynchus mykiss*	T	SV	**N**-Not within planned facilities due to a lack of water habitat.
bull trout *Salvelinus confluentus*	T	SC	**N**-Not within planned facilities due to a lack of water habitat.
Pacific lamprey *Lampetra tridentata*	SoC	SV	**N**-Not within planned facilities due to a lack of water habitat.

Status Key

Federal:

T	Threatened	SoC	Species of Concern
E	Endangered	NW	Not Warranted**;** delisted
C	Candidate	EPA	Bald and Golden Eagle Protection Act

BoCC USFWS Birds of Conservation Concern (BCR 9, Great Basin)

\- No special status

Note: All native migratory birds are protected by the federal Migratory Bird Treat Act (MBTA).

Oregon:

T Threatened

E Endangered

SC "Critical" sensitive species are those for which listing as threatened or endangered would be appropriate if immediate conservation actions were not taken. Some peripheral species which are at risk throughout their range and some disjunct populations (those that are geographically isolated from other populations) area also considered "Critical."

SV "Vulnerable" sensitive species are not in imminent danger of being listed as threatened or endangered, but could become sensitive-critical, threatened, or endangered with changes in populations, habitats or threats.

SP "Peripheral" species are on the edge of their range. "Naturally Rare" species are those with historically low population numbers in Oregon due to naturally limiting factors. The management objective is to maintain existing populations within their current range.

SU "Undetermined" species are those for which status is unclear. They may be susceptible to population declines that may result in listing as endangered, threatened, critical or vulnerable in the future, but additional research is needed before a decision can be made regarding their status.

Appendix D. Comprehensive list of plant species documented during rare plant surveys of the West Butte Wind Power Project, spring 2008.

Scientific Name	Common Name	Family	Nativity†	Notes
Achillea millefolium	common yarrow	*Asteraceae*	N	increaser
Agoseris grandiflora	bigflower agoseris	*Asteraceae*	N	
Allium tolmei	Tolmie's onion	*Liliaceae*	N	
Amelanchier alnifolia	Cusicks' serviceberry	*Rosaceae*	N	
Antennaria dimorpha	low pussytoes	*Asteraceae*	N	deep soils primarily
Antennaria media	Rocky mountain pussytoes	*Asteraceae*	N	
Arabis holboellii	Collins' rockcress	*Brassicaceae*	N	
Arenaria capillaris	Slender mountain sandwort	*Caryophyllaceae*	N	
Artemisia rigida	stiff sagebrush	*Asteraceae*	N	lithosols only
Artemisia tridentata	big sagebrush	*Asteraceae*	N	deep soils
Artemisia tridentata ssp. tridentata	basin big sagebrush	*Asteraceae*	N	
Artemisia tridentata ssp. vaseyana	mountain big sagebrush	*Asteraceae*	N	
Astragalus conjunctus	Idaho milkvetch	*Fabaceae*	N	
Astragalus curvicarpus	curvepod milkvetch	*Fabaceae*	N	
Astragalus cusickii	Cusick's milkvetch	*Fabaceae*	N	
Astragalus filipes	basalt milkvetch	*Fabaceae*	N	lithosol areas
Astragalus purshii	woollypod milkvetch	*Fabaceae*	N	lithosols / rocky sites
Balsamorhiza sagitatta	arrowleaf balsamroot	*Asteraceae*	N	
Blepharipappus scaber	rough eyelashweed	*Asteraceae*	N	
Bromus tectorum	cheatgrass	*Poaceae*	I	invasive
Calochortus macrocarpus	sagebrush mariposa lily	*Liliaceae*	N	deep soils only
Castilleja chlorotica	greentinge Indian paintbrush	*Scrophulariaceae*	N	ORNHIC List 1
Castilleja chromosa	northwestern Indian paintbrush	*Scrophulariaceae*	N	
Castilleja hispida	harsh Indian paintbrush	*Scrophulariaceae*	N	
Castilleja linarifolius	Wyoming Indian paintbrush	*Scrophulariaceae*	N	
Castilleja oresbia	pale Wallowa Indian paintbrush	*Scrophulariaceae*	N	
Castilleja pilosa	yellow paintbrush	*Scrophulariaceae*	N	
Chaenactis douglasii	Douglas's dustymaiden	*Asteraceae*	N	
Chorispora tenella	crossflower	*Brassicaceae*	I	invasive
Chrysothamnus viscidiflora	yellow rabbitbrush	*Asteraceae*	N	
Claytonia perfoliata	miner's lettuce	*Portulacaceae*	N	mesic areas
Collinsia parviflora	maiden blue eyed Mary	*Scrophulariaceae*	N	
Collomia grandiflora	grand colomia	*Polemoniaceae*	N	deep soil grasslands
Crepis occidentalis	large-flower hawksbeard	*Asteraceae*	N	
Delphinium nuttallianum	twolobe larkspur	*Ranunculaceae*	N	
Descurainia sophia	herb sophia	*Brassicaceae*	I	
Elymus elymoides	squirreltail	*Poaceae*	N	
Ericameria nauseosa	rubber rabbitbrush	*Asteraceae*	N	early seral
Erigeron filifolius	threadleaf fleabane	*Asteraceae*	N	

Scientific Name	Common Name	Family	Nativity†	Notes
Erigeron linearis	desert yellow fleabane	*Asteraceae*	N	
Erigeron poliospermus	purple cushion fleabane	*Asteraceae*	N	
Eriogonum elatum	tall woody buckwheat	*Polygonaceae*	N	
Eriogonum heracleoides	cream buckwheat	*Polygonaceae*	N	deep soils
Eriogonum strictum	strict buckwheat	*Polygonaceae*	N	lithosol only
Eriogonum umbellatum	sulpher-flower buckwheat	*Polygonaceae*	N	
Erysimum asperum	sanddune wallflower	*Brassicaceae*	N	
Festuca idahoensis	Idaho fescue	*Poaceae*	N	
Fritillaria affinis	checker lily	*Liliaceae*	N	
Geum triflorum	old man's whiskers	*Rosaceae*	N	
Hieracium cynoglossoides	houndstongue hawkweed	*Asteraceae*	N	
Hydrophyllum capitatum var. capitatum	ballhead waterleaf	*Hydrophyllaceae*	N	
Iris missouriensis	Rocky Mountain iris	*Iridaceae*	N	
Juniperus occidentalis	western juniper	*Cupressaceae*	N	
Layia glandulosa	whitedaisy tidytips	*Asteraceae*	N	
Leucocrinum montanum	common starlily	*Liliaceae*	N	
Lewisia rediviva	bitterroot	*Portulacaceae*	N	
Lithophragma glabra	bulbous woodland star	*Saxifragaceae*	N	
Lithophragma parviflora	smallflower woodland-star	*Saxifragaceae*	N	
Lithospermum ruderale	stoneseed	*Boraginaceae*	N	
Lomatium canbyi	Canby's biscuitroot	*Apiaceae*	N	
Lomatium macrocarpum	big-seed biscuitroot	*Apiaceae*	N	
Lomatium triternatum	nineleaf biscuitroot	*Apiaceae*	N	
Lupinus argenteus var. laxiflorus	silvery lupine	*Fabaceae*	N	
Lupinus lepidus var. lepidus	Pacific lupine	*Fabaceae*	N	
Lupinus saxosus	rock lupine	*Fabaceae*	N	
Mahonia repens	creeping barberry	*Berberidaceae*	N	
Mentha arvensis	wild mint	*Lamiaceae*	N	
Mentzelia albicaulis	whitestem blazing star	*Loasaceae*	N	
Microsteris gracilis	slender phlox	*Polemoniaceae*	N	
Mimulus nanus	dwarf purple monkeyflower	*Scrophulariaceae*	N	
Nothocalais troximoides	weevil prairie dandelion	*Asteraceae*	N	
Orobanche uniflora	oneflower broomrape	*Orobanchaceae*	N	
Packera canus	woolly groundsel	*Asteraceae*	N	
Packera tridentate	pincushion beardtongue	*Scrophulariaceae*	N	
Penstemon humilis	low beardtongue	*Scrophulariaceae*	N	
Penstemon procerus	littleflower penstemon	*Scrophulariaceae*	N	
Phacelia hastate	silverleaf phacelia	*Hydrophyllaceae*	N	
Phacelia linearis	threadleaf phacelia	*Hydrophyllaceae*	N	
Phlox hoodii	spiny phlox	*Polemoniaceae*	N	
Phoenicaulis cheiranthoides	wallflower phoenicaulis	*Brassicaceae*	N	
Pinus ponderosa	ponderosa pine	*Pinaceae*	N	
Plectritis macrocera	longhorn plectritis	*Valerianaceae*	N	
Poa secunda	Sandberg's bluegrass	*Poaceae*	N	
Potentilla gracilis	slender cinquefoil	*Rosaceae*	N	

Scientific Name	Common Name	Family	Nativity[†]	Notes
Prunus virginianus	western chokecherry	*Rosaceae*	N	
Pseudoroegneria spicata	bluebunch wheatgrass	*Poaceae*	N	
Purshia tridentata	antelope bitter-brush	*Rosaceae*	N	
Ranunculus testiculatus	curveseed butterwort	*Ranunculaceae*	N	
Ribes cereum	wax currant	*Grossulariaceae*	N	
Rosa woodsii	Woods' rose	*Rosaceae*	N	
Sisymbrium altissimum	tall tumble mustard	*Brassicaceae*	I	
Symphoricarpos albus	common snowberry	*Caprifoliaceae*	N	
Taraxacum officinale	common dandelion	*Asteraceae*	N	
Verbascum thapsus	common mullein	*Scrophulariaceae*	I	
Viola purpurea	goosefoot violet	*Violaceae*	N	
Zigadenus paniculatus	Foothill deathcamas	*Liliaceae*	N	

[†]N = Native, I = Introduced

Appendix E. Species list for all vertebrate wildlife detected during avian use surveys (large-plot) November 2007–October 2008 and small-plot avian surveys during May and June, 2008 at West Butte Wind Power Project.

Common Name	*Scientific Name*
Birds	
American goldfinch	*Carduelis tristis*
American kestrel	*Falco sparverius*
American robin	*Turdus migratorius*
ash-throated flycatcher	*Myiarchus tyraanuulus*
barn swallow	*Hirundo rustica*
black-billed magpie	*Pica hudsonia*
black-headed grosbeak*	*Pheucticus melanocephalus*
black-capped chickadee	*Poecile atricapillus*
Brewer's blackbird	*Euphagus cyanocephalus*
Brewer's sparrow	*Spizella breweri*
brown-headed cowbird*	*Molothrus ater*
California quail	*Callipepla californica*
calliope hummingbird	*Steelula calliope*
Canada goose	*Branta canadensis*
canyon wren	*Catherpes mexicanus*
Cassin's finch	*Carpodacus cassinii*
cedar waxwing	*Bombycilla cedorum*
chipping sparrow	*Spizella passerina*
chukar	*Alectoris chukar*
Clark's nutcracker	*Nucifraga columbiana*
common nighthawk	*Chordeiles minor*
common raven	*Corvus corax*
Cooper's hawk	*Accipiter cooperii*
dark-eyed junco	*Junco hyemalis*
European starling	*Sturnus vulgaris*
golden eagle	*Aquila chrysaetos*
gray flycatcher	*Empidonax wrightii*
greater sage-grouse	*Centrocercus urophasianus*
green-tailed towhee	*Pipilo chlorurus*
hairy woodpecker*	*Picoides villosus*
Hammond's flycatcher*	*Empidonax hammondii*
house finch	*Carpodacus mexicanus*
house wren	*Troglodytes aedon*
lark sparrow	*Chondestes grammacus*
mountain bluebird	*Sialia currucoides*
mountain chickadee	*Poecile gambeli*
mountain quail	*Oreortyx pictus*
mourning dove*	*Zenaida macroura*
northern flicker	*Colaptes auratus*
pinyon jay	*Gymnorhinus cynocephalus*
prairie falcon	*Falco mexicanus*
purple finch	*Carpodacus purpureus*

Common Name	*Scientific Name*
red-breasted nuthatch	*Sitta canadensis*
red-tailed hawk	*Buteo lineatus*
rock wren	*Salpinctes obsoletus*
rough-legged hawk	*Buteo lagopus*
ruby-crowned kinglet*	*Regulus calendula*
sage sparrow	*Amphispiza belli*
sage thrasher	*Oreoscoptes montanus*
spotted towhee	*Pipilo erythrophthalmus*
Townsend's solitaire	*Myadestes townsendi*
turkey vulture	*Cathartes aura*
unidentified hummingbird	
unidentified passerine	
Vaux's swift	*Chaetura vauxi*
vesper sparrow	*Pooecetes gramineus*
violet-green swallow	*Tachycineta thalassina*
western meadowlark	*Sturnella neglecta*
western tanager	*Piranga ludoviciana*
western wood-pewee*	*Contopus sordidulus*
white-crowned sparrow	*Zonotrichia leucophrys*
yellow-rumped warbler	*Dendroica coronata*
Mammals, Amphibians, Reptiles	
Belding's ground squirrel	*Spermohphilus beldingi*
black-tailed jackrabbit	*Lepus californicus*
coyote	*Canis latrans*
golden mantle ground squirrel	*Spermophilus lateralis*
least chipmunk	*Tamias minimus*
Merriam's ground squirrel	*Spermophilus canus*
mountain cottontail	*Sylvilagus nuttalli*
mule deer	*Odocoileus hemionus*
Pacific chorus frog	*Pseudacris regilla*
pronghorn	*Antilocapra americana*
pygmy short-horned lizard	*Phyrnosoma douglasii*
sagebrush lizard	*Sceloporus graciosus*
western fence lizard	*Sceloporus occidentalis*
yellow-bellied marmot	*Marmota flaviventris*

* Species only observed during small-plot avian surveys.

Appendix F. Species list for all vertebrate wildlife detected during special status wildlife species surveys during spring season 2008 at West Butte Wind Power Project.

Common Name	*Scientific Name*
Birds	
American kestrel	*Falco sparverius*
American robin	*Turdus migratorius*
ash-throated flycatcher	*Myiarchus tyraanuulus*
black-billed magpie	*Pica hudsonia*
black-headed grosbeak	*Pheucticus melanocephalus*
Brewer's blackbird	*Euphagus cyanocephalus*
Brewer's Sparrow	*Spizella breweri*
brown-headed cowbird	*Molothrus ater*
California quail	*Callipepla californica*
Cassin's finch	*Carpodacus cassinii*
chipping sparrow	*Spizella passerina*
Clark's nutcracker	*Nucifraga columbiana*
common raven	*Corvus corax*
Cooper's hawk	*Accipiter cooperii*
dark-eyed junco	*Junco hyemalis*
dusky flycatcher	*Empidonax oberholseri*
ferruginous hawk	*Buteo regalis*
gray flycatcher	*Empidonax wrightii*
greater sage-grouse	*Centrocercus urophasianus*
green-tailed towhee	*Pipilo chloruru*
horned lark	*Eremophila alpestris*
house finch	*Carpodacus mexicanus*
house wren	*Troglodytes aedon*
lark sparrow	*Chondestes grammacus*
lazuli bunting	*Passerina amoena*
loggerhead shrike	*Lanius ludovicianus*
mountain bluebird	*Sialia currucoides*
mountain chickadee	*Poecile gambeli*
mountain quail	*Oreortyx pictus*
mourning dove	*Zenaida macroura*
northern mockingbird	*Mimus polyglottos*
northern flicker	*Colaptes auratus*
orange-crowned warbler	*Vermivora celata*
prairie falcon	*Falco mexicanus*
red-breasted nuthatch	*Sitta canadensis*
red-tailed hawk	*Buteo lineatus*
rock wren	*Salpinctes obsoletus*
sage sparrow	*Amphispiza belli*
sage thrasher	*Oreoscoptes montanus*
sharp-shinned hawk	*Accipiter striatus*
spotted towhee	*Pipilo erythrophthalmus*
Townsend's solitaire	*Myadestes townsendi*

Common Name	*Scientific Name*
turkey vulture	*Cathartes aura*
vesper sparrow	*Pooecetes gramineus*
western kingbird	*Tyrannus verticalis*
western meadowlark	*Sturnella neglecta*
western scrub jay	*Aphelocoma coerulescens*
western tanager	*Piranga ludoviciana*
Wilson's warbler	*Wilsonia pusilla*
yellow-rumped warbler	*Dendroica coronata*
Mammals, Reptiles, Amphibians	
badger	*Taxidea taxus*
Belding's ground squirrel	*Spermohphilus beldingi*
coyote	*Canis latrans*
least chipmunk	*Tamias minimus*
mountain cottontail	*Sylvilagus nuttalli*
mule deer	*Odocoileus hemionus*
pronghorn	*Antilocapra Americana*
sagebrush lizard	*Sceloporus graciosus*

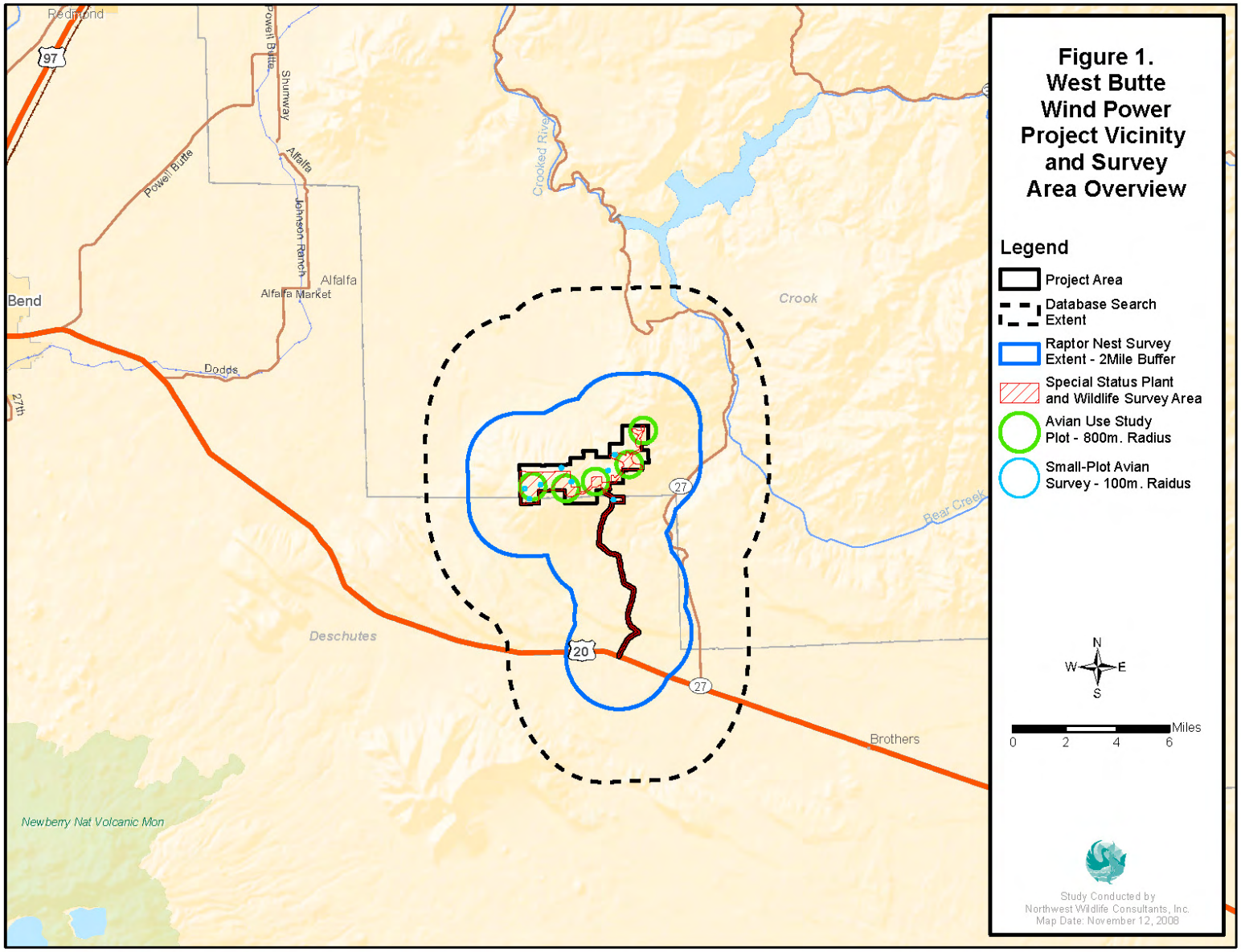


Figure 1.
West Butte
Wind Power
Project Vicinity
and Survey
Area Overview
Legend
Project Area
Database Search Extent
Raptor Nest Survey Extent - 2Mile Buffer
Special Status Plant and Wildlife Survey Area
Avian Use Study Plot - 800m. Radius
Small-Plot Avian Survey - 100m. Raidus
N
W
E
S
Miles
0
2
4
6
Study Conducted by
Northwest Wildlife Consultants, Inc.
Map Date: November 12, 2008
Redmond
Powell Butte
Shumway
Alfalfa
Johnson Ranch
Alfalfa
Alfalfa Market
Bend
Dodds
27th
Crooked River
Crook
Rear Creek
Deschutes
Brothers
Newberry Nat Volcanic Mon
97
20
27

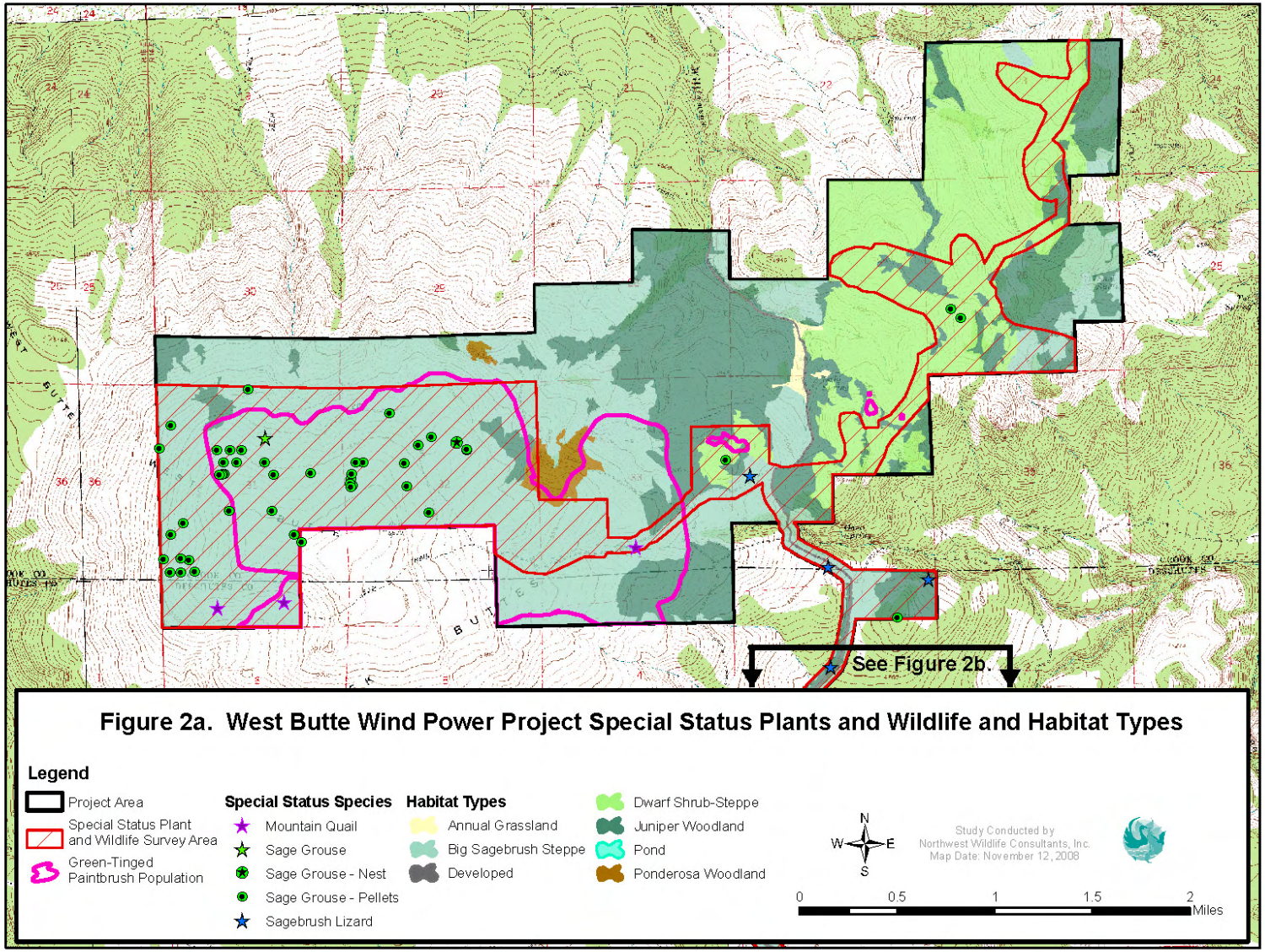
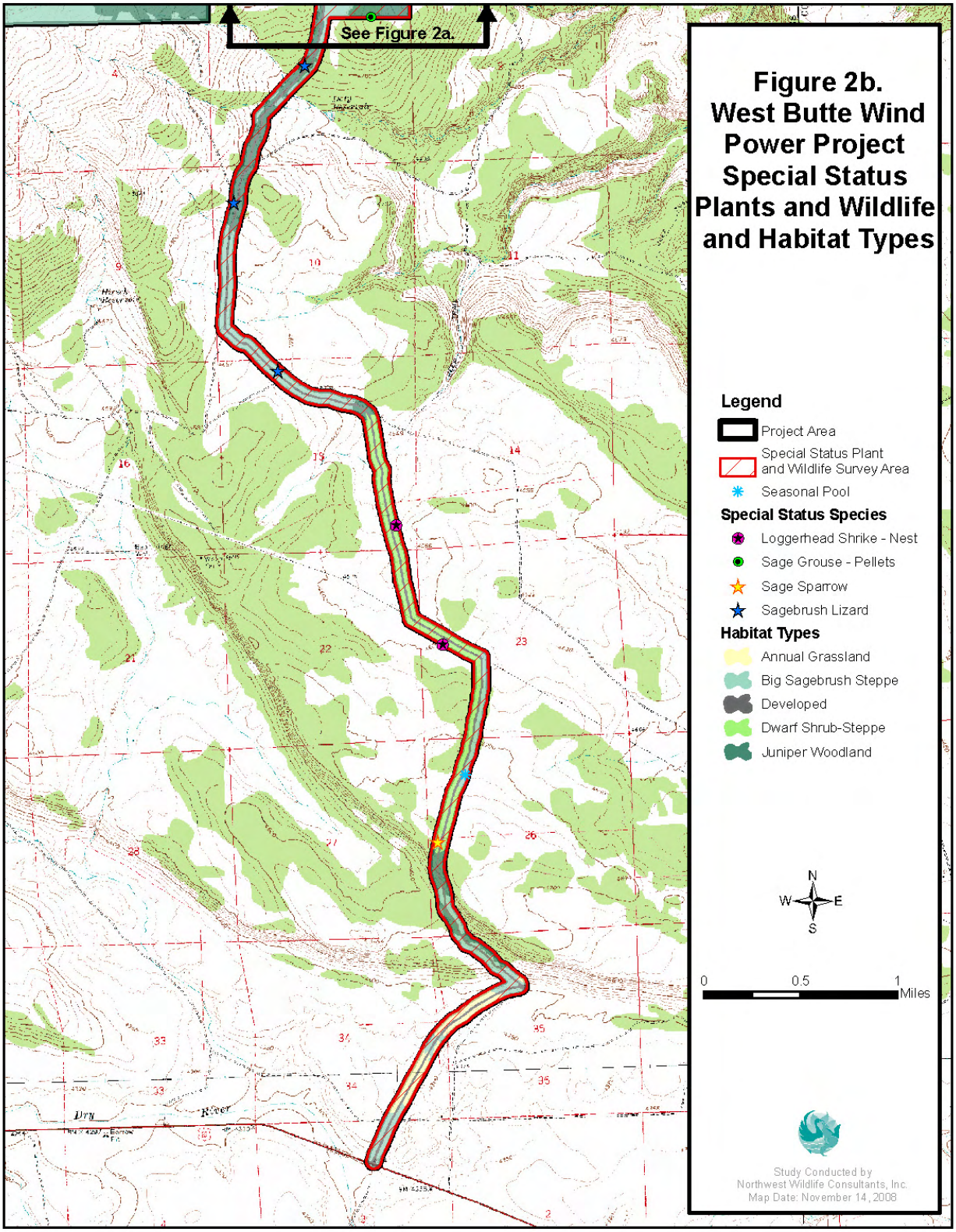


Figure 2a. West Butte Wind Power Project Special Status Plants and Wildlife and Habitat Types


See Figure 2a.
Figure 2b.
West Butte Wind Power Project
Special Status Plants and Wildlife and Habitat Types
Legend
Project Area
Special Status Plant and Wildlife Survey Area
Seasonal Pool
Special Status Species
Loggerhead Shrike - Nest
Sage Grouse - Pellets
Sage Sparrow
Sagebrush Lizard
Habitat Types
Annual Grassland
Big Sagebrush Steppe
Developed
Dwarf Shrub-Steppe
Juniper Woodland
N
W
E
S
0
0.5
1
Miles
Study Conducted by
Northwest Wildlife Consultants, Inc.
Map Date: November 14, 2008

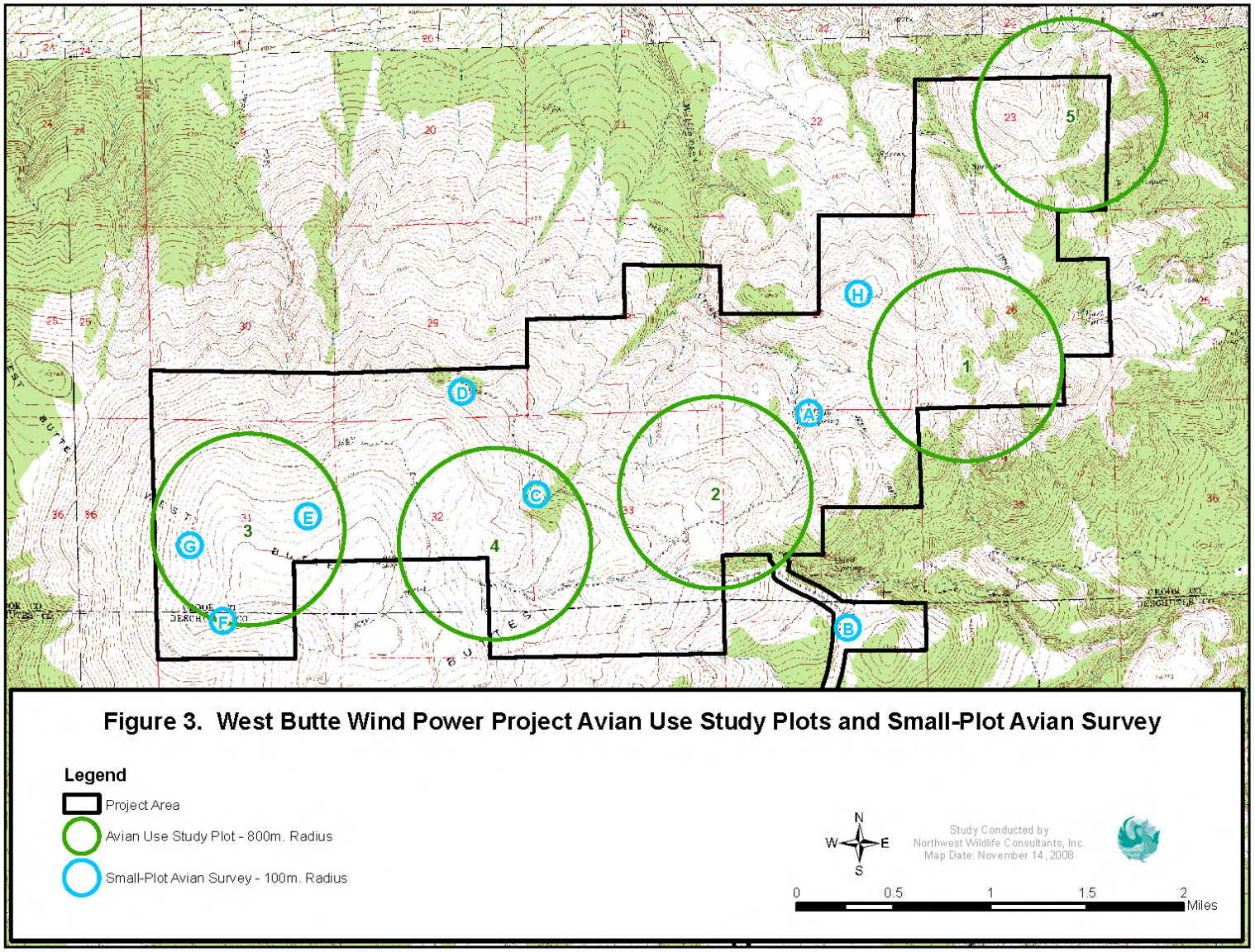


Figure 3. West Butte Wind Power Project Avian Use Study Plots and Small-Plot Avian Survey

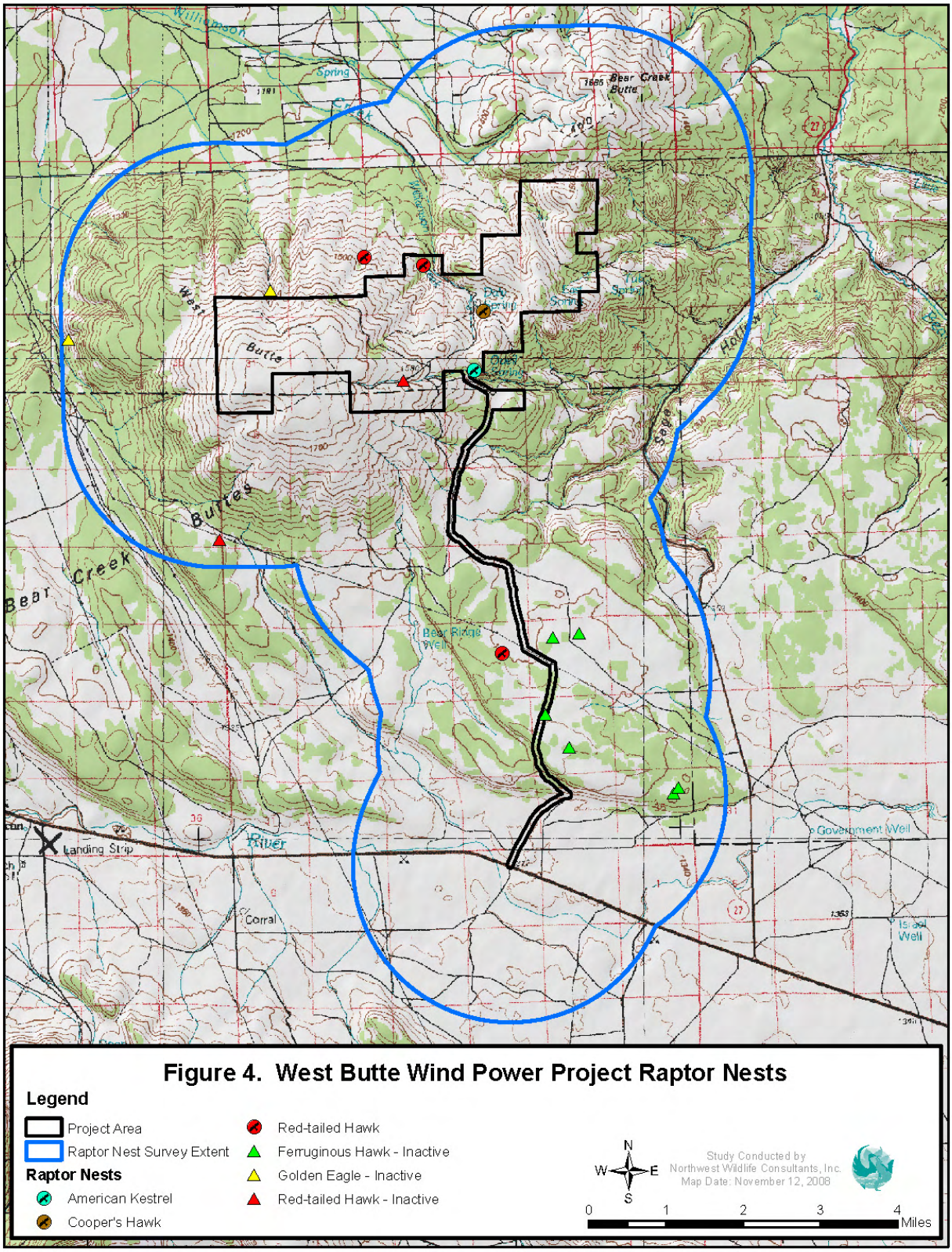


Figure 4. West Butte Wind Power Project Raptor Nests